# Chapter 5. Radar

## Section 1. General

### 5-1-1. PRESENTATION AND EQUIPMENT PERFORMANCE

Provide radar service only if you are personally satisfied that the radar presentation and equipment performance is adequate for the service being provided.

*NOTE-*
*The provision of radar service is not limited to the distance and altitude parameters obtained during the commissioning flight check.*

### 5-1-2. ALIGNMENT ACCURACY CHECK

During relief briefing, or as soon as possible after assuming responsibility for a control position, check the operating equipment for alignment accuracy and display acceptability. Recheck periodically throughout the watch.

*REFERENCE-*
*FAAO 7210.3, Chapter 3, Chapter 8, Chapter 9, Chapter 10, and Chapter 11.*
*Comparable Military Directives.*

*TERMINAL*

**a.** Check the alignment of the radar video display by assuring that the video/digital map or overlay is properly aligned with a permanent target of known range and azimuth on the radar display. Where possible, check one permanent target per quadrant.

**b.** Accuracy of the radar video display shall be verified for digitized radar systems by using the moving target indicator (MTI) reflectors, fixed location beacon transponders (Parrots), beacon real-time quality control (RTQC) symbols or calibration performance monitor equipment (CPME) beacon targets.

*REFERENCE-*
*FAAO 7210.3, Tolerance for Radar Fix Accuracy, Para 3-8-1.*

*EN ROUTE*

**c.** When operating in the narrowband mode (Stage A) alignment checking is accomplished by the operational program as part of the certification procedures for system startup and then on a real-time basis during operational hours.

**d.** When operating in the EDARC/DARC/HOST or EDARC/DARC mode, ensure the PVD/MDM center and altitude limits for the system are appropriate for the operating position.

*REFERENCE-*
*FAAO 7110.65, Selected Altitude Limits, Para 5-14-5.*

### 5-1-3. RADAR USE

Use radar information derived from primary and secondary radar systems.

*REFERENCE-*
*FAAO 7110.65, Beacon Range Accuracy, Para 5-1-4.*
*FAAO 7110.65, Inoperative or Malfunctioning Interrogator, Para 5-2-15.*

**a.** Secondary radar may be used as the sole display source as follows:

**1.** In Class A airspace.

*REFERENCE-*
*FAAO 7110.65, Failed Transponder in Class A Airspace, Para 5-2-16.*
*14 CFR Section 91.135, Operations in Class A Airspace.*

**2.** Outside Class A airspace, or where mix of Class A airspace/non-Class A airspace exists, only when:

**(a)** Additional coverage is provided by secondary radar beyond that of the primary radar.

**(b)** The primary radar is temporarily unusable or out of service. Advise pilots when these conditions exist.

***PHRASEOLOGY-***
*PRIMARY RADAR OUT OF SERVICE. RADAR TRAFFIC ADVISORIES AVAILABLE ON TRANSPONDER AIRCRAFT ONLY.*

*NOTE-*
**1.** *Advisory may be omitted when provided on ATIS and pilot indicates having ATIS information.*

**2.** *Advisory may be omitted when there is overlapping primary radar coverage from multiple radar sites.*

**(c)** A secondary radar system is the only source of radar data for the area of service. When the system is used for separation, beacon range accuracy is assured, as provided in para 5-1-4, Beacon Range Accuracy.

*NOTE-*
**1.** *This provision is to authorize secondary radar only operations where there is no primary radar available and the condition is temporary.*

**2.** *Since Terminal facilities use Long Range Radar, this is applicable to En Route and Terminal Radar Facilities.*

**b.** *TERMINAL.* Do not use secondary radar to conduct surveillance (ASR) final approaches unless the system is fully digitized, or an emergency exists and the pilot concurs.

## 5-1-4. BEACON RANGE ACCURACY

**a.** You may use beacon targets for separation purposes if beacon range accuracy is verified by one of the following methods:

*NOTE-*
**1.** *The check for verification of beacon range accuracy accomplished by correlation of beacon and primary radar targets of the same aircraft is not a check of display accuracy. Therefore, it is not necessary that it be done using the same display with which separation is being provided, nor the same targets being separated.*

**2.** *Narrowband: Beacon range accuracy for automated narrowband display equipment is verified by AF personnel. Consequently, further verification by the controller is unnecessary.*

**1.** Correlate beacon and primary targets of the same aircraft (not necessarily the one being provided separation) to assure that they coincide.

**2.** When beacon and primary targets of the same aircraft do not coincide, correlate them to assure that any beacon displacement agrees with the specified distance and direction for that particular radar system.

**3.** Refer to beacon range monitoring equipment where so installed.

**b.** If beacon range accuracy cannot be verified, you may use beacon targets only for traffic information.

*REFERENCE-*
*FAAO 7110.65, Radar Use, Para 5-1-3.*

## 5-1-5. ECM/ECCM ACTIVITY

**a.** Refer all ECM/ECCM activity requests to the appropriate center supervisor.

*REFERENCE-*
*FAAO 7610.4, Chapter 2, Section 7, Electronic Counter Measures (ECM) Missions/Exercises.*

*NOTE-*
*ECM activity can subsequently result in a request to apply ECCM videos to the radar system which may necessitate the decertification of the narrowband search radar. The Systems Engineer should be consulted concerning the effect of ECM/ECCM on the operational use of the narrowband radar prior to approving/disapproving requests to conduct ECM/ECCM activity.*

**b.** When ECM activity interferes with the operational use of radar:

**1.** *EN ROUTE.* Request the responsible military unit or aircraft, if initial request was received directly from pilot, to suspend the activity.

**2.** *TERMINAL.* Request suspension of the activity through the ARTCC. If immediate cessation of the activity is required, broadcast the request directly to the ECM aircraft on the emergency frequency. Notify the ARTCC of direct broadcast as soon as possible.

**c.** When previously suspended activity will no longer interfere:

**3.** *EN ROUTE.* Inform the NORAD unit or aircraft that it may be resumed.

**4.** *TERMINAL.* Inform the ARTCC or aircraft that it may be resumed. Obtain approval from the ARTCC prior to broadcasting a resume clearance directly to the aircraft.

**d.** In each stop request, include your facility name, type of ECM activity (chaff dispensing- "stream"/ "burst" or electronic jamming- "buzzer"), radar band affected and, when feasible, expected duration of suspension.

*PHRASEOLOGY-*
*BIG PHOTO (identification, if known) (name) CENTER/ TOWER/APPROACH CONTROL.*

*To stop ECM activity:*

*STOP STREAM/BURST IN AREA (area name) (degree and distance from facility),*

*or*

*STOP BUZZER ON (frequency band or channel).*

*To resume ECM activity*

*RESUME STREAM/BURST,*

*or*

*RESUME BUZZER ON (frequency band or channel).*

## 5-1-6. SERVICE LIMITATIONS

**a.** When radar mapping is not available, limit radar services to:

**1.** Separating identified aircraft targets.

**2.** Vectoring aircraft to intercept a PAR final approach course.

3. Providing radar service in areas that ensure no confliction with traffic on airways, other ATC areas of jurisdiction, restricted or prohibited areas, terrain, etc.

**b.** *EN ROUTE.* Stage A and DARC- When the position symbol associated with the full data block falls more than one history behind the actual aircraft target or there is no target symbol displayed, the Mode C information in the full data block shall not be used for the purpose of determining separation.

**c.** Report radar malfunctions immediately for corrective action and for dispatch of a Notice to Airmen. Advise adjacent ATC facilities when appropriate.

*REFERENCE-*
*FAAO 7110.65, Reporting Essential Flight Information, Para 2-1-9.*
*FAAO 7210.3, Chapter 3, Chapter 7, Chapter 10 Section 5, and Chapter 11 Section 2.*

## 5-1-7. ELECTRONIC CURSOR

*TERMINAL*

**a.** An electronic cursor may be used to aid in identifying and vectoring an aircraft and to give finer delineation to a video map. Do not use it as a substitute for a video map or map overlay; e.g., to form intersections, airway boundaries, final approach courses, etc.

**b.** Fixed electronic cursors may be used to form the final approach course for surveillance approaches conducted by military operated mobile radar facilities.

## 5-1-8. MERGING TARGET PROCEDURES

**a.** Except while they are established in a holding pattern, apply merging target procedures to all radar identified:

1. Aircraft at 10,000 feet and above.

2. Turbojet aircraft regardless of altitude.

*REFERENCE-*
*P/CG Term- Turbojet Aircraft.*

3. Presidential aircraft regardless of altitude.

**b.** Issue traffic information to those aircraft listed in subpara a whose targets appear likely to merge unless the aircraft are separated by more than the appropriate vertical separation minima.

*EXAMPLE-*
*"Traffic twelve o'clock, seven miles, eastbound, MD-80, at one seven thousand."*

*"United Sixteen and American Twenty-five, traffic twelve o'clock, one zero miles, opposite direction, eastbound seven twenty seven at flight level three three zero, westbound MD-Eighty at flight level three one zero."*

**c.** If the pilot requests, vector his/her aircraft to avoid merging with the target of previously issued traffic.

*NOTE-*
*Aircraft closure rates are so rapid that when applying merging target procedures, controller issuance of traffic must be commenced in ample time for the pilot to decide if a vector is necessary.*

**d.** If unable to provide vector service, inform the pilot.

## 5-1-9. HOLDING PATTERN SURVEILLANCE

Provide radar surveillance of outer fix holding pattern airspace areas, or any portions thereof, shown on your radar scope (displayed on the video map or scribed on the map overlay) whenever aircraft are holding there. Attempt to detect any aircraft that stray outside the area. If you detect an aircraft straying outside the area, assist it to return to the assigned airspace.

## 5-1-10. DEVIATION ADVISORIES

Inform an aircraft when it is observed in a position and on a track which will obviously cause the aircraft to deviate from its protected airspace area. If necessary, assist the aircraft to return to the assigned protected airspace.

*REFERENCE-*
*FAAO 7110.65, Route or Altitude Amendments, Para 4-2-5.*
*FAAO 7110.65, Methods, Para 7-9-3.*

## 5-1-11. RADAR FIX POSTING

*EN ROUTE*

A controller is required to manually record at least once the observed or reported time over a fix for each controlled aircraft in their sector of responsibility only when the flight progress recording components of the HOST/DARC or the EARTS systems are not operational.

*REFERENCE-*
*FAAO 7210.3, Flight Progress Strip Usage, Para 6-1-6.*
*FAAO 7210.3, Flight Progress Strip Usage, Para 10-1-8.*

## 5-1-12. POSITION REPORTING

If necessary, you may request an aircraft to provide an estimate or report over a specific fix. After an aircraft receives the statement "radar contact" from ATC, it discontinues reporting over compulsory reporting points. It resumes normal position reporting when ATC informs it "radar contact lost" or "radar service terminated."

*REFERENCE-*
*P/CG Term- Radar Contact.*

**a.** When required, inform an aircraft of its position with respect to a fix or airway.

*PHRASEOLOGY-*
*OVER/PASSING (fix).*

*(Number of miles) MILES FROM (fix).*

*(Number of miles) MILES (direction) OF (fix, airway, or location).*

*CROSSING/JOINING/DEPARTING (airway or route).*

*INTERCEPTING/CROSSING (name of NAVAID) (specified) RADIAL.*

## 5-1-13. RADAR SERVICE TERMINATION

**a.** Inform aircraft when radar service is terminated.

*PHRASEOLOGY-*
*RADAR SERVICE TERMINATED (nonradar routing if required).*

**b.** Radar service is automatically terminated and the aircraft needs not be advised of termination when:

*NOTE-*
**1.** *Termination of radar monitoring when conducting simultaneous ILS/MLS approaches is prescribed in para 5-9-7, Simultaneous Independent ILS/MLS Approaches- Dual & Triple.*

**2.** *Termination of radar monitoring where PAR equipment is used to monitor approaches is prescribed in para 5-13-3, Monitor Information.*

**1.** An aircraft cancels its IFR flight plan, except within Class B airspace, Class C airspace, TRSA, or where basic radar service is provided.

**2.** An aircraft conducting an instrument, visual, or contact approach has landed or has been instructed to change to advisory frequency.

**3.** At tower-controlled airports where radar coverage does not exist to within $^1/_2$ mile of the end of the runway, arriving aircraft shall be informed when radar service is terminated.

*REFERENCE-*
*FAAO 7210.3, Radar Tolerances, Para 10-5-6.*

**4.** *TERMINAL.* An arriving VFR aircraft receiving radar service to a tower-controlled airport within Class B airspace, Class C airspace, TRSA, or where basic radar service is provided has landed, or to all other airports, is instructed to change to tower or advisory frequency.

**5.** *TERMINAL.* An aircraft completes a radar approach.

*REFERENCE-*
*FAAO 7110.65, Service Provided When Tower is Inoperative, Para 7-6-12.*

# Section 2. Beacon Systems

## 5-2-1. ASSIGNMENT CRITERIA

**a.** General.

**1.** Mode 3/A is designated as the common military/ civil mode for air traffic control use.

**2.** Make radar beacon code assignments to only Mode 3/A transponder-equipped aircraft.

**b.** Unless otherwise specified in a directive or a letter of agreement, make code assignments to departing, en route, and arrival aircraft in accordance with the procedures specified in this section for the radar beacon code environment in which you are providing ATC service. Give first preference to the use of discrete beacon codes.

***PHRASEOLOGY-***
*SQUAWK THREE/ALFA (code),*

*or*

*SQUAWK (code).*

***NOTE-***
*A code environment is determined by an operating position's/sector's equipment capability to decode radar beacon targets using either the first and second or all four digits of a beacon code.*

***REFERENCE-***
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-2. DISCRETE ENVIRONMENT

**a.** Issue discrete beacon codes assigned by the computer. Computer-assigned codes may be modified as required.

**1.** *TERMINAL.* Aircraft that will remain within the terminal facility's delegated airspace shall be assigned a code from the code subset allocated to the terminal facility.

**2.** *TERMINAL.* Unless otherwise specified in a facility directive or a letter of agreement, aircraft that will enter an adjacent ATTS facility's delegated airspace shall be assigned a beacon code assigned by the ARTCC computer.

***NOTE-***
**1.** *This will provide the adjacent facility advance information on the aircraft and will cause auto-acquisition of the aircraft prior to handoff.*

**2.** *When an IFR aircraft, or a VFR aircraft that has been assigned a beacon code by the host computer and whose flight plan will terminate in another facility's area, cancels ATC service or does not activate the flight plan, send a remove strips (RS) message on that aircraft via host keyboard, the FDIO keyboard, or call via service F.*

**b.** Make handoffs to other positions/sectors on the computer-assigned code.

**c.** Coastal facilities accepting "over" traffic that will subsequently be handed-off to an oceanic ARTCC shall reassign a new discrete beacon code to an aircraft when it first enters the receiving facility's airspace. The code reassignment shall be accomplished by inputting an appropriate message into the computer and issued to the pilot while operating in the first sector/position in the receiving facility's airspace.

***NOTE-***
*Per an agreement between FAA and the Department of Defense, 17 Code subsets in the NBCAP have been reserved for exclusive military use outside NBCAP airspace. To maximize the use of these subsets, they have been allocated to ARTCC's underlying NBCAP airspace that do not abut an oceanic ARTCC's area. To preclude a potential situation where two aircraft might be in the same airspace at the same time on the same discrete code, it is necessary to reassign an aircraft another code as specified in subpara c.*

***REFERENCE-***
*FAAO 7110.65, Mixed Environment, Para 5-2-4.*
*FAAO 7110.65, VFR Code Assignments, Para 5-2-9.*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-3. NONDISCRETE ENVIRONMENT

**a.** Assign appropriate nondiscrete beacon codes from the function codes specified in para 5-2-6, Function Code Assignments.

**b.** Unless otherwise coordinated at the time of handoff, make handoffs to other positions/sectors on an appropriate nondiscrete function code.

***REFERENCE-***
*FAAO 7110.65, Mixed Environment, Para 5-2-4.*
*FAAO 7110.65, VFR Code Assignments, Para 5-2-9.*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-4. MIXED ENVIRONMENT

**a.** When discrete beacon code capability does not exist in your area of responsibility, comply with the procedures specified in para 5-2-3, Nondiscrete Environment.

*NOTE-*
*In a mixed code environment, a situation may exist where a discrete-equipped position/sector exchanges control of aircraft with nondiscrete-equipped facilities or vice versa.*

**b.** When discrete beacon code capability exists in your area of responsibility:

**1.** Comply with the procedures specified in para 5-2-2, Discrete Environment, and

**2.** Unless otherwise coordinated at the time of handoff, assign aircraft that will enter the area of responsibility of a nondiscrete-equipped position/sector an appropriate nondiscrete function code from the codes specified in para 5-2-6, Function Code Assignments, prior to initiating a handoff.

*REFERENCE-*
*FAAO 7110.65, IFR-VFR and VFR-IFR Flights, Para 4-2-8.*
*FAAO 7110.65, VFR Code Assignments, Para 5-2-9.*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-5. RADAR BEACON CODE CHANGES

Unless otherwise specified in a directive or a letter of agreement or coordinated at the time of handoff, do not request an aircraft to change from the code it was squawking in the transferring facility's area until the aircraft is within your area of responsibility.

*REFERENCE-*
*FAAO 7110.65, IFR-VFR and VFR-IFR Flights, Para 4-2-8.*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-6. FUNCTION CODE ASSIGNMENTS

Unless otherwise specified by a directive or a letter of agreement, make nondiscrete code assignments from the following categories:

**a.** Assign codes to departing IFR aircraft as follows:

**1.** **Code 2000** to an aircraft which will climb to FL 240 or above or to an aircraft which will climb to FL 180 or above where the base of Class A airspace and the base of the operating sector are at FL 180, and for inter-facility handoff the receiving sector is also stratified at FL 180. The en route code shall not be assigned until the aircraft is established in the high altitude sector.

**2.** **Code 1100** to an aircraft which will remain below FL 240 or below FL 180 as above.

**3.** For handoffs from terminal facilities when so specified in a letter of agreement as follows:

**(a)** Within NBCAP airspace- **Code 0100 to Code 0400** inclusive or any other code authorized by the regional air traffic division.

**(b)** Outside NBCAP airspace- **Code 1000** or one of the codes from **0100 to 0700** inclusive or any other code authorized by the regional air traffic division.

**b.** Assign codes to en route IFR aircraft as follows:

*NOTE-*
*1. FL 180 may be used in lieu of FL 240 where the base of Class A airspace and the base of the operating sector are at FL 180, and for inter-facility handoff the receiving sector is also stratified at FL 180.*

*2. The provisions of subparas b2(b) and (c) may be modified by facility directive or letter of agreement when operational complexities or simplified sectorization indicate. Letters of agreement are mandatory when the operating sectors of two facilities are not stratified at identical levels. The general concept of utilizing codes 2100 through 2500 within Class A airspace should be adhered to.*

**1.** Aircraft operating below FL 240 or when control is transferred to a controller whose area includes the stratum involved.

**(a)** **Code 1000** may be assigned to aircraft changing altitudes.

**(b)** **Code 1100** to an aircraft operating at an assigned altitude below FL 240. Should an additional code be operationally desirable, **code 1300** shall be assigned.

**2.** Aircraft operating at or above FL 240 or when control is transferred to a controller whose area includes the stratum involved.

**(a)** **Code 2300** may be assigned to aircraft changing altitudes.

**(b)** **Code 2100** to an aircraft operating at an assigned altitude from FL 240 to FL 330 inclusive. Should an additional code be operationally desirable, **code 2200** shall be assigned.

**(c)** **Code 2400** to an aircraft operating at an assigned altitude from FL 350 to FL 600 inclusive. Should an additional code be operationally desirable, **code 2500** shall be assigned.

**3.** **Code 4000** when aircraft are operating on a flight plan specifying frequent or rapid changes in assigned altitude in more than one stratum or other conditions of flight not compatible with a stratified code assignment.

*NOTE-*
1. *Categories of flight that can be assigned code 4000 include certain flight test aircraft, MTR missions, aerial refueling operation requiring descent involving more than one stratum, ALTRV's where continuous monitoring of ATC communications facilities is not required and frequent altitude changes are approved, and other aircraft operating on flight plans requiring special handling by ATC.*

2. *Military aircraft operating VFR or IFR in restricted/warning areas or VFR on VR routes will adjust their transponders to reply on code 4000 unless another code has been assigned by ATC or coordinated, if possible, with ATC.*

**c.** Assign the following codes to arriving IFR aircraft, except military turbojet aircraft as specified in para 4-7-4, Radio Frequency and Radar Beacon Changes for Military Aircraft:

*NOTE-*
*FL 180 may be used in lieu of FL 240 where the base of Class A airspace and the base of the operating sector are at FL 180, and for inter-facility handoff the receiving sector is also stratified at FL 180.*

**1. Code 2300** may be assigned for descents while above FL 240.

**2. Code 1500** may be assigned for descents into and while within the strata below FL 240, or with prior coordination the specific code utilized by the destination controller, or the code currently assigned when descent clearance is issued.

**3.** The applicable en route code for the holding altitude if holding is necessary before entering the terminal area and the appropriate code in subparas 1 or 2.

*REFERENCE-*
*FAAO 7110.65, IFR-VFR and VFR-IFR Flights, Para 4-2-8.*
*FAAO 7110.65, Nondiscrete Environment, Para 5-2-3.*
*FAAO 7110.65, Mixed Environment, Para 5-2-4.*
*FAAO 7110.65, VFR Code Assignments, Para 5-2-9.*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-7. EMERGENCY CODE ASSIGNMENT

Assign codes to emergency aircraft as follows:

**a. Code 7700** when the pilot declares an emergency and the aircraft is not radar identified.

*PHRASEOLOGY-*
*SQUAWK MAYDAY ON 7700.*

**b.** After radio and radar contact have been established, you may request other than single-piloted helicopters and single-piloted turbojet aircraft to change from **code 7700** to another code appropriate for your radar beacon code environment.

*NOTE-*
1. *The code change, based on pilot concurrence, the nature of the emergency, and current flight conditions will signify to other radar facilities that the aircraft in distress is identified and under ATC control.*

2. *Pilots of single-piloted helicopters and single-piloted turbojet aircraft may be unable to reposition transponder controls during the emergency.*

*PHRASEOLOGY-*
*RADAR CONTACT (position). IF FEASIBLE, SQUAWK (code).*

*REFERENCE-*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

**c.** The following shall be accomplished on a Mode C equipped VFR aircraft which is in emergency but no longer requires the assignment of **code 7700**:

**1.** *TERMINAL.* Assign a beacon code that will permit terminal minimum safe altitude warning (MSAW) alarm processing.

**2.** *EN ROUTE.* An appropriate keyboard entry shall be made to ensure en route MSAW (EMSAW) alarm processing.

## 5-2-8. RADIO FAILURE

When you observe a **code 7600** display, apply the procedures in para 10-4-4, Communications Failure.

*NOTE-*
*Should a transponder-equipped aircraft experience a loss of two-way radio communications capability, the pilot can be expected to adjust his/her transponder to code 7600.*

*REFERENCE-*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-9. VFR CODE ASSIGNMENTS

**a.** For VFR aircraft receiving radar advisories, assign an appropriate function code or computer-assigned code for the code environment in which you are providing service.

*NOTE-*
1. *Para 5-2-2, Discrete Environment; para 5-2-3, Nondiscrete Environment, and para 5-2-4, Mixed Environment, specify code assignment procedures to follow for the three code environments.*

2. *Para 5-2-6, Function Code Assignments, specifies the function code allocation from which an appropriate code for the aircraft indicated in subpara a should be selected. In the terminal environment, additional function codes may be authorized by the regional air traffic division.*

1. If the aircraft is outside of your area of responsibility and an operational benefit will be gained by retaining the aircraft on your frequency for the purpose of providing services, ensure that coordination has been effected:

(a) As soon as possible after positive identification, and

(b) Prior to issuing a control instruction or providing a service other than a safety alert/traffic advisory.

*NOTE-*
*Safety alerts/traffic advisories may be issued to an aircraft prior to coordination if an imminent situation may be averted by such action. Coordination should be effected as soon as possible thereafter.*

b. Instruct IFR aircraft which cancel an IFR flight plan and are not requesting radar advisory service and VFR aircraft for which radar advisory service is being terminated to squawk the VFR code.

***PHRASEOLOGY-***
*SQUAWK VFR.*

*or*

*SQUAWK 1200.*

*NOTE-*
1. *Aircraft not in contact with an ATC facility may squawk 1255 in lieu of 1200 while en route to/from or within the designated fire fighting area(s).*

2. *VFR aircraft which fly authorized SAR missions for the USAF or USCG may be advised to squawk 1277 in lieu of 1200 while en route to/from or within the designated search area.*

*REFERENCE-*
*FAAO 7110.66, National Beacon Code Allocation Plan.*

c. When an aircraft changes from VFR to IFR, the controller shall assign a beacon code to Mode C equipped aircraft that will allow MSAW alarms.

*REFERENCE-*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-10. BEACON CODE FOR PRESSURE SUIT FLIGHTS AND FLIGHTS ABOVE FL 600

a. Mode 3/A, **code 4400**, and discrete codes **4401 through 4477** are reserved for use by R-71, F-12, U-2, B-57, pressure suit flights, and aircraft operations above FL 600.

*NOTE-*
*The specific allocation of the special use codes in subset 4400 is in FAAO 7110.66, National Beacon Code Allocation Plan.*

b. Ensure that aircraft remain on **code 4400** or one of the special use discrete codes in the **4400** subset if filed as part of the flight plan. Except when unforeseen events, such as weather deviations, equipment failure, etc., cause more than one aircraft with same Mode 3/A discrete beacon codes to be in the same or adjacent ARTCC's airspace at the same time, a controller may request the pilot to make a code change, squawk standby, or to stop squawk as appropriate.

*NOTE-*
*Due to the inaccessibility of certain equipment to the flight crews, **code 4400** or a discrete code from the **4400** subset is preset on the ground and will be used throughout the flight profile including operations below FL 600. Controllers should be cognizant that not all aircraft may be able to accept the transponder changes identified in the exception. Emergency **code 7700**, however, can be activated.*

*REFERENCE-*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-11. AIR DEFENSE EXERCISE BEACON CODE ASSIGNMENT

*EN ROUTE*

Ensure exercise FAKER aircraft remain on the exercise flight plan filed discrete beacon code.

*NOTE-*
1. *NORAD will ensure exercise FAKER aircraft flight plans are filed containing discrete beacon codes from the Department of Defense code allocation specified in FAAO 7610.4, Special Military Operations, Appendix 8.*

2. *NORAD will ensure that those FAKER aircraft assigned the same discrete beacon code are not flight planned in the same or any adjacent ARTCC's airspace at the same time. (Simultaneous assignment of codes will only occur when operational requirements necessitate.)*

*REFERENCE-*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-12. STANDBY OR LOW SENSITIVITY OPERATION

You may instruct an aircraft operating on an assigned code to change transponder to "standby" or "low sensitivity" position:

*NOTE-*
*National standards no longer require improved transponder to be equipped with the low sensitivity feature. Therefore, aircraft with late model transponders will be unable to respond to a request to "squawk low."*

**a.** When approximately 15 miles from its destination and you no longer desire operation of the transponder.

**b.** When necessary to reduce clutter in a multi-target area, or to reduce "ring-around" or other phenomena, provided you instruct the aircraft to return to "normal sensitivity" position as soon as possible thereafter.

*PHRASEOLOGY-*
*SQUAWK STANDBY,*

*or*

*SQUAWK LOW/NORMAL.*

***REFERENCE-***
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-13. CODE MONITOR

Continuously monitor the Mode 3/A radar beacon codes assigned for use by aircraft operating within your area of responsibility when nonautomated beacon decoding equipment (e.g., 10-channel decoder) is used to display the target symbol.

***REFERENCE-***
*FAAO 7110.65, Function Code Assignments, Para 5-2-6.*

*NOTE-*
*In addition to alphanumeric and control symbology processing enhancements, the M-EARTS, STARS, and the TPX-42 systems are equipped with automatic beacon decoders. Therefore, in facilities where the automatic beacon decoders are providing the control slash video, there is no requirement to have the nonautomated decoding equipment operating simultaneously.*

***REFERENCE-***
*FAAO 7210.3, Monitoring of Mode 3/A Radar Beacon Codes, Para 3-7-4.*

**a.** This includes the appropriate IFR code actually assigned and, additionally, **code 1200, code 1255,** and **code 1277** unless your area of responsibility includes only Class A airspace. During periods when ring-around or excessive VFR target presentations derogate the separation of IFR traffic, the monitoring of VFR **code 1200, code 1255, and code 1277** may be temporarily discontinued.

**b.** Positions of operation which contain a restricted or warning area or VR route within or immediately adjacent to their area of jurisdiction shall monitor **code 4000** and any other code used in lieu of **4000** within the warning/restricted area or VR route. If by local coordination with the restricted/warning area or VR route user a code other than 4000 is to be exclusively used, then this code shall be monitored.

**c.** If a normally assigned beacon code disappears, check for a response on the following codes in the order listed and take appropriate action:

*NOTE-*
*When codes 7500 and/or 7600 have been preselected, it will be necessary for the ID-SEL-OFF switches for these codes to be left in the off position so that beacon target for an aircraft changing to one of these codes will disappear, thereby alerting the controller to make the check. This check will not be required if automatic alerting capability exists.*

1. **Code 7500** (hijack code).

***REFERENCE-***
*FAAO 7110.65, Hijacked Aircraft, Para 10-2-6.*

2. **Code 7600** (loss of radio communications code).

## 5-2-14. FAILURE TO DISPLAY ASSIGNED BEACON CODE OR INOPERATIVE/ MALFUNCTIONING TRANSPONDER

**a.** Inform an aircraft with an operable transponder that the assigned beacon code is not being displayed.

*PHRASEOLOGY-*
*(Identification) RESET TRANSPONDER, SQUAWK (appropriate code).*

**b.** Inform an aircraft when its transponder appears to be inoperative or malfunctioning.

*PHRASEOLOGY-*
*(Identification) YOUR TRANSPONDER APPEARS INOPERATIVE/MALFUNCTIONING, RESET, SQUAWK (appropriate code).*

**c.** Ensure that the subsequent control position in the facility or the next facility, as applicable, is notified when an aircraft transponder is malfunctioning/inoperative.

***REFERENCE-***
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-15. INOPERATIVE OR MALFUNCTIONING INTERROGATOR

Inform aircraft concerned when the ground interrogator appears to be inoperative or malfunctioning.

*PHRASEOLOGY-*
*(Name of facility or control function) BEACON INTERROGATOR INOPERATIVE/MALFUNCTIONING.*

***REFERENCE-***
*FAAO 7110.65, Radar Use, Para 5-1-3.*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-16. FAILED TRANSPONDER IN CLASS A AIRSPACE

Disapprove a request or withdraw previously issued approval to operate in Class A airspace with a failed transponder solely on the basis of traffic conditions or other operational factors.

*REFERENCE-*
*FAAO 7110.65, Radar Use, Para 5-1-3.*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-17. VALIDATION OF MODE C READOUT

Ensure that Mode C altitude readouts are valid after accepting an interfacility handoff, initial track start, track start from coast/suspend tabular list, missing, or unreasonable Mode C readouts. For TPX-42 and equivalent systems ensure that altitude readout is valid immediately after identification. (TCDD-/BANS-equipped tower cabs are not required to validate Mode C readouts after receiving interfacility handoffs from TRACON's according to the procedures in para 5-4-3, Methods, subpara a4.)

**a.** Consider an altitude readout valid when:

**1.** It varies less than 300 feet from the pilot reported altitude, or

***PHRASEOLOGY-***
*(If aircraft is known to be operating below the lowest useable flight level),*

*SAY ALTITUDE.*

*or*

*(If aircraft is known to be operating at or above the lowest useable flight level),*

*SAY FLIGHT LEVEL.*

**2.** You receive a continuous readout from an aircraft on the airport and the readout varies by less than 300 feet from the field elevation, or

***NOTE-***
*A continuous readout exists only when the altitude filter limits are set to include the field elevation.*

***REFERENCE-***
*FAAO 7110.65, Altitude Filters, Para 5-2-23.*
*FAAO 7110.65, Selected Altitude Limits, Para 5-14-5.*
*FAAO 7210.3, Display Data, Para 11-2-3.*

**3.** You have correlated the altitude information in your data block with the validated information in a data block generated in another facility (by verbally coordinating with the other controller) and your readout is exactly the same as the readout in the other data block.

**b.** When unable to validate the readout, do not use the Mode C altitude information for separation.

**c.** Whenever you observe an invalid Mode C readout below FL 180:

**1.** Issue the correct altimeter setting and confirm the pilot has accurately reported the altitude.

***PHRASEOLOGY-***
*(Location) ALTIMETER (appropriate altimeter), VERIFY ALTITUDE.*

**2.** If the altitude readout continues to be invalid:

**(a)** Instruct the pilot to turn off the altitude-reporting part of his/her transponder and include the reason; and

**(b)** Notify the operations supervisor-in-charge of the aircraft call sign.

***PHRASEOLOGY-***
*STOP ALTITUDE SQUAWK. ALTITUDE DIFFERS BY (number of feet) FEET.*

**d.** Whenever you observe an invalid Mode C readout at or above FL 180, unless the aircraft is descending below Class A airspace:

**1.** Confirm that the pilot is using 29.92 Hg of mercury as the altimeter setting and has accurately reported the altitude.

***PHRASEOLOGY-***
*CONFIRM USING TWO NINER NINER TWO AS YOUR ALTIMETER SETTING.*

*(If aircraft is known to be operating at or above the lowest useable flight level),*

*VERIFY FLIGHT LEVEL.*

**2.** If the Mode C readout continues to be invalid:

**(a)** Instruct the pilot to turn off the altitude-reporting part of his/her transponder and include the reason; and

**(b)** Notify the operational supervisor-in-charge of the aircraft call sign.

***PHRASEOLOGY-***
*STOP ALTITUDE SQUAWK. ALTITUDE DIFFERS BY (number of feet) FEET.*

**e.** Whenever possible, inhibit altitude readouts on all consoles when a malfunction of the ground equipment causes repeated invalid readouts.

## 5-2-18. ALTITUDE CONFIRMATION- MODE C

Request a pilot to confirm assigned altitude on initial contact unless:

*NOTE-*
*For the purpose of this paragraph, "initial contact" means a pilot's first radio contact with each sector/position.*

**a.** The pilot states the assigned altitude, or

**b.** You assign a new altitude to a climbing or a descending aircraft, or

**c.** The Mode C readout is valid and indicates that the aircraft is established at the assigned altitude, or

**d.** *TERMINAL.* The aircraft was transferred to you from another sector/position within your facility (intra-facility).

***PHRASEOLOGY-***
*(In level flight situations), VERIFY AT (altitude/flight level).*

*(In climbing/descending situations),*

*(if aircraft has been assigned an altitude below the lowest useable flight level),*

*VERIFY ASSIGNED ALTITUDE (altitude).*

*or*

*(If aircraft has been assigned a flight level at or above the lowest useable flight level),*

*VERIFY ASSIGNED FLIGHT LEVEL (flight level).*

***REFERENCE-***
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-19. ALTITUDE CONFIRMATION- NON-MODE C

**a.** Request a pilot to confirm assigned altitude on initial contact unless:

*NOTE-*
*For the purpose of this paragraph, "initial contact" means a pilot's first radio contact with each sector/position.*

**1.** The pilot states the assigned altitude, or

**2.** You assign a new altitude to a climbing or a descending aircraft, or

**3.** *TERMINAL.* The aircraft was transferred to you from another sector/position within your facility (intrafacility).

***PHRASEOLOGY-***
*(In level flight situations), VERIFY AT (altitude/flight level).*

*(In climbing/descending situations), VERIFY ASSIGNED ALTITUDE/FLIGHT LEVEL (altitude/flight level).*

**b. USA.** Reconfirm all pilot altitude read backs.

***PHRASEOLOGY-***
*(If the altitude read back is correct),*

*AFFIRMATIVE (altitude).*

*(If the altitude read back is not correct),*

*NEGATIVE. CLIMB/DESCEND AND MAINTAIN (altitude),*

*or*

*NEGATIVE. MAINTAIN (altitude).*

***REFERENCE-***
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-20. AUTOMATIC ALTITUDE REPORTING

Inform an aircraft when you want it to turn on/off the automatic altitude reporting feature of its transponder.

***PHRASEOLOGY-***
*SQUAWK ALTITUDE,*

*or*

*STOP ALTITUDE SQUAWK.*

***NOTE-***
*Controllers should be aware that not all aircraft have a capability to disengage the altitude squawk independently from the beacon code squawk. On some aircraft both functions are controlled by the same switch.*

***REFERENCE-***
*FAAO 7110.65, Validation of Mode C Readout, Para 5-2-17.*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*
*P/CG Term- Automatic Altitude Report.*

## 5-2-21. INFLIGHT DEVIATIONS FROM TRANSPONDER/MODE C REQUIREMENTS BETWEEN 10,000 FEET AND 18,000 FEET

Apply the following procedures to requests to deviate from the Mode C transponder requirement by aircraft operating in the airspace of the 48 contiguous states and the District of Columbia at and above 10,000 feet MSL and below 18,000 feet MSL, excluding the airspace at and below 2,500 feet AGL.

*NOTE-*
**1.** *14 CFR Section 91.215(b) provides, in part, that all U.S. registered civil aircraft must be equipped with an operable, coded radar beacon transponder when operating in the altitude stratum listed above. Such transponders shall have a Mode 3/A 4096 code capability, replying to Mode 3/A interrogation with the code specified by ATC, or a Mode S capability, replying to Mode 3/A interrogations with the code specified by ATC. The aircraft must also be equipped with automatic pressure altitude reporting equipment having a Mode C capability that automatically replies to Mode C interrogations by transmitting pressure altitude information in 100-foot increments.*

**2.** *The exception to 14 CFR Section 91.215 (b) is 14 CFR Section 91.215(b)(5) which states: except balloons, gliders, and aircraft without engine-driven electrical systems.*

*REFERENCE-*
*FAAO 7210.3, Temporary Flight Restrictions, Chapter 18, Section 4.*

**a.** Except in an emergency, do not approve inflight requests for authorization to deviate from 14 CFR Section 91.215(b)(5)(i) requirements originated by aircraft without transponder equipment installed.

**b.** Approve or disapprove other inflight deviation requests, or withdraw approval previously issued to such flights, solely on the basis of traffic conditions and other operational factors.

**c.** Adhere to the following sequence of action when an inflight VFR deviation request is received from an aircraft with an inoperative transponder or Mode C, or is not Mode C equipped:

**1.** Suggest that the aircraft conduct its flight in airspace unaffected by the CFR's.

**2.** Suggest that the aircraft file an IFR flight plan.

**3.** Suggest that the aircraft provide a VFR route of flight and maintain radio contact with ATC.

**d.** Do not approve an inflight deviation unless the aircraft has filed an IFR flight plan or a VFR route of flight is provided and radio contact with ATC is maintained.

**e.** You may approve an inflight deviation request which includes airspace outside your jurisdiction without the prior approval of the adjacent ATC sector/facility providing a transponder/Mode C status report is forwarded prior to control transfer.

**f.** Approve or disapprove inflight deviation requests within a reasonable period of time or advise when approval/disapproval can be expected.

*REFERENCE-*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-22. BEACON TERMINATION

Inform an aircraft when you want it to turn off its transponder.

***PHRASEOLOGY-***

*STOP SQUAWK.*

*(For a military aircraft when you do not know if the military service requires that it continue operating on another mode),*

*STOP SQUAWK (mode in use).*

*REFERENCE-*
*FAAO 7110.65, Beacon Identification Methods, Para 5-3-3.*

## 5-2-23. ALTITUDE FILTERS

*TERMINAL*

Set altitude filters to display Mode C altitude readouts to encompass all altitudes within the controller's jurisdiction. Set the upper limits no lower than 1,000 feet above the highest altitude for which the controller is responsible. In those stratified positions, set the lower limit to 1,000 feet or more below the lowest altitude for which the controller is responsible. When the position's area of responsibility includes down to an airport field elevation, the facility will normally set the lower altitude filter limit to encompass the field elevation so that provisions of para 2-1-6, Safety Alert, and para 5-2-17, Validation of Mode C Readout, subpara a2 may be applied. Air traffic managers may authorize temporary suspension of this requirement when target clutter is excessive.

# Section 3. Radar Identification

## 5-3-1. APPLICATION

Before you provide radar service, establish and maintain radar identification of the aircraft involved, except as provided in para 5-5-1, Application, subparas b2 and 3.

*REFERENCE-*
*FAAO 7110.65, Use of Tower Radar Displays, Para 3-1-9.*

## 5-3-2. PRIMARY RADAR IDENTIFICATION METHODS

Identify a primary or radar beacon target by using one of the following methods:

**a.** Observing a departing aircraft target within 1 mile of the takeoff runway end at airports with an operating control tower, provided one of the following methods of coordination is accomplished.

**1.** A verbal rolling/boundary notification is issued for each departure, or

**2.** A nonverbal rolling/boundary notification is used for each departure aircraft.

*NOTE-*
*Nonverbal notification can be accomplished via the use of a manual or electronic "drop tube" or automation.*

**b.** Observing a target whose position with respect to a fix (displayed on the video map, scribed on the map overlay, or displayed as a permanent echo) or a visual reporting point (whose range and azimuth from the radar antenna has been accurately determined and made available to the controller) corresponds with a direct position report received from an aircraft, and the observed track is consistent with the reported heading or route of flight. If a TACAN/VORTAC is located within 6,000 feet of the radar antenna, the TACAN/VORTAC may be used as a reference fix for radar identification without being displayed on the video map or map overlay.

*NOTE-*
*1. Establishment of radar identification through use of DME position information can be complicated by the fact that some military TACAN's are not collocated with frequency-paired VOR's and might be separated from them by as much as 31 miles.*

*2. Visual reporting points used for RADAR identification are limited to those most used by pilots and whose range and azimuth have been determined by supervisory personnel.*

**c.** Observing a target make an identifying turn or turns of 30 degrees or more, provided the following conditions are met:

*NOTE-*
*Use of identifying turns or headings which would cause the aircraft to follow normal IFR routes or known VFR flight paths might result in misidentification. When these circumstances cannot be avoided, additional methods of identification may be necessary.*

**1.** Except in the case of a lost aircraft, a pilot position report is received which assures you that the aircraft is within radar coverage and within the area being displayed.

**2.** Only one aircraft is observed making these turns.

**3.** For aircraft operating in accordance with an IFR clearance, you either issue a heading away from an area which will require an increased minimum IFR altitude or have the aircraft climb to the highest minimum altitude in your area of jurisdiction before you issue a heading.

*REFERENCE-*
*FAAO 7110.65, Use of Tower Radar Displays, Para 3-1-9.*
*FAAO 7110.65, Surveillance Unusable, Para 5-12-10.*

## 5-3-3. BEACON IDENTIFICATION METHODS

When using only Mode 3/A radar beacon to identify a target, use one of the following methods:

**a.** Request the aircraft to activate the "IDENT" feature of the transponder and then observe the identification display.

*NOTE-*
*1. At facilities where the single-slash "IDENT" modification is installed or other decoder modifications have been made which increase the number of "blooming" target displays, it will be necessary to exercise additional care to preclude the possibility of misidentification.*

*2. TERMINAL. When automated displays are operated in the analog mode, the "IDENT" return is displayed as a double slash and the emergency return as a single bloomer whenever the beacon control head is in the "fail" position.*

*PHRASEOLOGY-*
*IDENT.*
*SQUAWK (code) AND IDENT.*

**b.** Request the aircraft to change to a specific discrete or nondiscrete code, as appropriate, and then observe the target or code display change. If a code

change is required in accordance with Section 2, Beacon Systems, of this chapter, use the codes specified therein.

**c.** Request the aircraft to change transponder to "standby." After you observe the target disappear for sufficient scans to assure that loss of target resulted from placing the transponder in "standby" position, request the aircraft to return transponder to normal operation and then observe the reappearance of the target.

***PHRASEOLOGY-***
*SQUAWK STANDBY,*

*then*

*SQUAWK NORMAL.*

**d.** *EN ROUTE.* During narrowband operations, an aircraft may be considered identified when the full data block is automatically associated with the beacon target symbol of an aircraft that is squawking a discrete code assigned by the computer.

***PHRASEOLOGY-***
*SQUAWK (4 digit discrete code), AND IF YOUR ALTITUDE REPORTING EQUIPMENT IS TURNED OFF, SQUAWK ALTITUDE.*

***NOTE-***
*The AIM informs pilots to adjust Mode C transponders with altitude reporting capability activated unless deactivation is requested by ATC. Squawk altitude is included to provide applicable phraseology.*

***REFERENCE-***
*FAAO 7110.65, Use of Tower Radar Displays, Para 3-1-9.*
*FAAO 7110.65, Position Information, Para 5-3-6.*

## 5-3-4. TERMINAL AUTOMATION SYSTEMS IDENTIFICATION METHODS

*TERMINAL*

**a.** Consider an auto-acquired aircraft as identified when the data block is displayed and is visible to you, and one of the following conditions exist:

**1.** The radar or beacon identification procedures have been used to confirm the identity of the tagged target.

**2.** The aircraft is being handed off using a NAS automated system and one of the following does not appear in the data block: "CST", "NAT", "NT", "AMB", "OLD", "NB", "TU", "AM", or "OL".

**b.** Use the data block to maintain target identity unless it is in a coast status or displaced from the appropriate target.

**c.** A displaced data block shall be updated at all times.

***REFERENCE-***
*FAAO 7110.65, Use of Tower Radar Displays, Para 3-1-9.*

## 5-3-5. QUESTIONABLE IDENTIFICATION

**a.** Use more than one method of identification when proximity of targets, duplication of observed action, or any other circumstances cause doubt as to target identification.

**b.** If identification is questionable for any reason, take immediate action to reidentify the aircraft or terminate radar service.

***REFERENCE-***
*FAAO 7110.65, Methods, Para 5-4-3.*

## 5-3-6. POSITION INFORMATION

Inform an aircraft of its position whenever radar identification is established by means of identifying turns or by any of the beacon identification methods outlined in para 5-3-3, Beacon Identification Methods. Position information need not be given when identification is established by position correlation or when a departing aircraft is identified within 1 mile of the takeoff runway end.

## 5-3-7. IDENTIFICATION STATUS

**a.** Inform an aircraft of radar contact when:

**1.** Initial radar identification in the ATC system is established.

**2.** Subsequent to loss of radar contact or terminating radar service, radar identification is reestablished.

***PHRASEOLOGY-***
*RADAR CONTACT (position if required).*

**b.** Inform an aircraft when radar contact is lost.

***PHRASEOLOGY-***
*RADAR CONTACT LOST (alternative instructions when required).*

## 5-3-8. TARGET MARKERS

*EN ROUTE*

**a.** Use radar target markers (shrimp boats) on horizontal scopes to provide continuous target identity. Post flight identification and altitude when constant, on

markers. Post miscellaneous items (abbreviated route, vector headings, arrows to indicate climb and descent, etc.) at your discretion. To prevent misinterpretation, use standard hand printed characters.

**b.** Automated Systems. Retain data blocks that are associated with the appropriate target symbol in order to maintain continuous identity of aircraft. Retain the data block until the aircraft has exited the sector or delegated airspace, and all potential conflicts have been resolved; including an aircraft that is a point out. The data block shall display flight identification and altitude information, as a minimum. The displayed altitude may be assigned, interim, or reported, whichever is appropriate.

## 5-3-9. TARGET MARKERS

*TERMINAL*

Automated Systems. Retain data blocks that are associated with the appropriate target symbol in order to maintain continuous identity of aircraft. Retain the data block until the aircraft has exited the sector or delegated airspace, and all potential conflicts have been resolved; including an aircraft that is a point out. The data block shall display flight identification and altitude information, as a minimum.

***NOTE-***

*Where delegated airspace extends beyond Class B and/or Class C airspace, the following will apply: If a VFR aircraft is clear of Class B and Class C airspace and radar services have been terminated then retention of the data block is no longer required.*

# Section 4. Transfer of Radar Identification

## 5-4-1. APPLICATION

To provide continuous radar service to an aircraft and facilitate a safe, orderly, and expeditious flow of traffic, it is often necessary to transfer radar identification of an aircraft from one controller to another. This section describes the terms, methods, and responsibilities associated with this task. Interfacility and intrafacility transfers of radar identification shall be accomplished in all areas of radar surveillance except where it is not operationally feasible. Where such constraints exist, they shall be:

**a.** Covered in letters of agreement which clearly state that control will not be based upon a radar handoff, or

**b.** Coordinated by the transferring and receiving controllers for a specified period of time.

*REFERENCE-*
*FAAO 7110.65, Coordination with Receiving Facility, Para 4-3-7.*

## 5-4-2. TERMS

**a.** *Handoff.* An action taken to transfer the radar identification of an aircraft from one controller to another controller if the aircraft will enter the receiving controller's airspace and radio communications with the aircraft will be transferred.

**b.** *Radar Contact.* The term used to inform the controller initiating a handoff that the aircraft is identified and approval is granted for the aircraft to enter the receiving controller's airspace.

**c.** *Point Out.* A physical or automated action taken by a controller to transfer the radar identification of an aircraft to another controller if the aircraft will or may enter the airspace or protected airspace of another controller and radio communications will not be transferred.

**d.** *Point Out Approved.* The term used to inform the controller initiating a point out that the aircraft is identified and that approval is granted for the aircraft to enter the receiving controller's airspace, as coordinated, without a communications transfer or the appropriate automated system response.

**e.** *Traffic.* A term used to transfer radar identification of an aircraft to another controller for the purpose of coordinating separation action. Traffic is normally issued:

1. In response to a handoff or point out;

2. In anticipation of a handoff or point out; or

3. In conjunction with a request for control of an aircraft.

**f.** *Traffic Observed.* The term used to inform the controller issuing the traffic restrictions that the traffic is identified and that the restrictions issued are understood and will be complied with.

## 5-4-3. METHODS

**a.** Transfer the radar identification of an aircraft by at least one of the following methods:

1. Physically point to the target on the receiving controller's display.

2. Use landline voice communications.

3. Use automation capabilities.

4. *TERMINAL.* Use the "Modify" or "Quick Look" functions for data transfer between the TRACON and tower cab only if specific procedures are established in a facility directive. The local controller has the responsibility to determine whether or not conditions are adequate for the use of ARTS/STARS data on the BRITE/DBRITE/TDW.

*REFERENCE-*
*FAAO 7210.3, Use of Modify and Quick Look Functions, Para 11-2-4.*
*FAAO 7210.3, Use of Stars Quick Look Functions, Para 11-8-4.*

5. *EN ROUTE.* EDARC/HOST or DARC/HOST have interfacility handoff capabilities that can be manually initiated and accepted through the Quick Action Keys (QAK), or used in automatic handoff mode as in HOST Stage A. DARC or EDARC do not have the capabilities for interfacility handoffs. Therefore, handoffs between facilities must be made via landline voice communications when operating in DARC or EDARC.

**b.** When making a handoff, point-out, or issuing traffic restrictions, relay information to the receiving controller in the following order:

1. The position of the target relative to a fix, map symbol, or radar target known and displayed by both the receiving and transferring controller. Mileage from the reference point may be omitted when relaying the position of a target if a full data block associated with the target has been forced on the receiving controller's radar display.

*EXAMPLE-*
*"Point out, Southwest of Richmond VOR..."*

2. The aircraft identification, as follows:

(a) The aircraft call sign, or

(b) The discrete beacon code of the aircraft during interfacility point-outs only, if both the receiving and the transferring controllers agree.

*NOTE-*
*Acceptance of a point-out using the discrete beacon code as the aircraft's identification constitutes agreement.*

3. The assigned altitude, appropriate restrictions, and information that the aircraft is climbing or descending, if applicable, except when inter/intrafacility directives ensure that the altitude information will be known by the receiving controller.

*NOTE-*
1. *When physically pointing to the target, you do not have to state the aircraft position.*

2. *Those en route facilities using host software that provides capability for passing interim altitude shall include the specific operations and procedures for use of this procedure in a LOA between the appropriate facilities.*

***PHRASEOLOGY-***
*HANDOFF/POINT-OUT/TRAFFIC (aircraft position) (aircraft ID),*

*or*

*(discrete beacon code point-out only) (altitude, restrictions, and other appropriate information, if applicable).*

c. When receiving a handoff, point-out, or traffic restrictions, respond to the transferring controller as follows:

***PHRASEOLOGY-***
*(Aircraft ID) (restrictions, if applicable) RADAR CONTACT,*

*or*

*(aircraft ID or discrete beacon code) (restrictions, if applicable) POINT-OUT APPROVED,*

*or*

*TRAFFIC OBSERVED,*

*or*

*UNABLE (appropriate information, as required).*

d. If any doubt as to target identification exists after attempting confirmation in accordance with this section, apply the provisions of para 5-3-5, Questionable Identification.

***REFERENCE-***
*FAAO 7110.65, Validation of Mode C Readout, Para 5-2-17.*

## 5-4-4. TRAFFIC

a. When using the term "traffic" for coordinating separation, the controller issuing traffic shall issue appropriate restrictions.

b. The controller accepting the restrictions shall be responsible to ensure that approved separation is maintained between the involved aircraft.

## 5-4-5. TRANSFERRING CONTROLLER HANDOFF

The transferring controller shall:

a. Complete a radar handoff prior to an aircraft's entering the airspace delegated to the receiving controller.

***REFERENCE-***
*FAAO 7110.65, Coordinate Use of Airspace, Para 2-1-14.*
*FAAO 7110.65, Control Transfer, Para 2-1-15.*
*FAAO 7110.65, Receiving Controller Handoff, Para 5-4-6.*

b. Verbally obtain the receiving controller's approval prior to making any changes to an aircraft's flight path, altitude, or data block information while the handoff is being initiated or after acceptance, unless otherwise specified by a LOA or a facility directive.

***NOTE-***
*Those en route facilities using host software that provides capability for passing interim altitude shall include the specific operations and procedures for use of this procedure in a LOA between the appropriate facilities.*

c. Ensure that, prior to transferring communications:

1. Potential violations of adjacent airspace and potential conflicts between aircraft in their own area of jurisdiction are resolved.

2. Necessary coordination has been accomplished with all controllers through whose area of jurisdiction the aircraft will pass prior to entering the receiving controller's area of jurisdiction, except when such coordination is the receiving controller's responsibility as stated in para 5-4-6, Receiving Controller Handoff, and unless otherwise specified by a LOA or a facility directive.

3. Restrictions issued to ensure separation are passed to the receiving controller.

**d.** After transferring communications, continue to comply with the requirements of subparas c1 and 2.

**e.** Comply with restrictions issued by the receiving controller unless otherwise coordinated.

**f.** Comply with the provisions of para 2-1-17, Radio Communications Transfer, subparas a and b. To the extent possible, transfer communications when the transfer of radar identification has been accepted.

*NOTE-*
*Before the ARTS/STARS "modify/quick look" function is used to transfer radar identification, a facility directive which specifies communication transfer points is required.*

**g.** Advise the receiving controller of pertinent information not contained in the data block or flight progress strip unless covered in a LOA or facility directive. Pertinent information includes:

1. Assigned heading.
2. Air speed restrictions.
3. Altitude information issued.
4. Observed track or deviation from the last route clearance.
5. The beacon code if different from that normally used or previously coordinated.
6. Any other pertinent information.

**h.** Ensure that the data block is associated with the appropriate target.

**i.** Initiate verbal coordination to verify the position of primary or nondiscrete targets when using the automated handoff functions except for intrafacility handoffs using single-sensor systems or multisensor systems operating in a mosaic RDP mode.

**j.** Initiate verbal coordination before transferring control of a track when "CST", "FAIL", "NONE", "NB", "NX", "IF", or "NT" is displayed in the data block.

**k.** Advise the receiving controller that radar monitoring is required when the aircraft is on a direct route initiated by ATC that exceeds usable NAVAID distances.

**l.** Issue restrictions to the receiving controller which are necessary to maintain separation from other aircraft within your area of jurisdiction before releasing control of the aircraft.

**m.** Consider the target being transferred as identified on the receiving controller's display when the receiving controller acknowledges receipt verbally or has accepted an automated handoff.

**n.** Accomplish the necessary coordination with any intervening controllers whose area of jurisdiction is affected by the receiving controller's delay in the climb or the descent of an aircraft through the vertical limits of your area of jurisdiction when the receiving controller advises you of that delay before accepting the transfer of radar identification unless otherwise specified by a LOA or a facility directive.

## 5-4-6. RECEIVING CONTROLLER HANDOFF

The receiving controller shall:

**a.** Ensure that the target position corresponds with the position given by the transferring controller or that there is an appropriate association between an automated data block and the target being transferred before accepting a handoff.

*REFERENCE-*
*FAAO 7110.65, Coordinate Use of Airspace, Para 2-1-14.*
*FAAO 7110.65, Control Transfer, Para 2-1-15.*
*FAAO 7110.65, Transferring Controller Handoff, Para 5-4-5.*

**b.** Issue restrictions that are needed for the aircraft to enter your sector safely before accepting the handoff.

**c.** Comply with restrictions issued by the initiating controller unless otherwise coordinated.

**d.** Before you issue control instructions directly to an aircraft that is within another controller's area of jurisdiction that will change that aircraft's heading, route, speed, altitude, or beacon code, ensure that coordination has been accomplished with each of the controllers listed below whose area of jurisdiction is affected by those instructions unless otherwise specified by a LOA or a facility directive:

*NOTE-*
*Those en route facilities using host software that provides capability for passing interim altitude shall include the specific operations and procedures for use of this procedure in a LOA between the appropriate facilities.*

1. The controller within whose area of jurisdiction the control instructions will be issued.
2. Any intervening controller(s) through whose area of jurisdiction the aircraft will pass.

**e.** After accepting a handoff from another controller, confirm the identity of primary target by advising the aircraft of its position, and of a beacon target by observing a code change, an "ident" reply, or a "standby" squawk unless one of these was used during handoff. These provisions do not apply at those towers and GCA's which have been delegated the responsibility for providing radar separation within designated areas by the parent approach control facility and the aircraft identification is assured by sequencing or positioning prior to the handoff.

*REFERENCE-*
*FAAO 7110.65, Approach Separation Responsibility, Para 5-9-5.*

**f.** When using appropriate equipment, consider a discrete beacon target's identity to be confirmed when:

**1.** The data block associated with the target being handed off indicates the computer assigned discrete beacon code is being received, or

**2.** You observe the deletion of a discrete code that was displayed in the data block, or

*NOTE-*
*When the aircraft generated discrete beacon code does not match the computer assigned beacon code, the code generated will be displayed in the data block. When the aircraft changes to the assigned discrete code, the code disappears from the data block. In this instance, the observance of code removal from the data block satisfies confirmation requirements.*

**3.** You observe the numeric display of a discrete code that an aircraft has been instructed to squawk or reports squawking.

**g.** Initiate verbal coordination prior to accepting control of a track when "CST", "NAT", "NT", "NONE", "NB", "NX", "OLD", "OL", "AMB", "AM", or "TU" is displayed in the data block.

**1.** When an automated interfacility handoff action is initiated and "AMB" or "AM" is displayed in the full data block, advise the other facility that a disparity exists between the position declared by their computer and that declared by your ARTS/PIDP/STARS system.

**2.** When an automated interfacility handoff action is initiated and "NAT," "NT," or "TU" is displayed in the full data block, advise the other facility if a disparity exists between the position declared by their computer and the actual target position.

**h.** Advise the transferring controller, prior to accepting the transfer of radar identification, that you will delay the climb or the descent of an aircraft through the vertical limits of the transferring controller's area of jurisdiction, unless otherwise specified in a LOA or a facility directive.

*NOTE-*
*Those en route facilities using HOST software that provides capability for passing interim altitude shall include the specific operations and procedures for use of this procedure in a LOA between the appropriate facilities.*

**i.** If you decide, *after* accepting the transfer of radar identification, to delay the aircraft's climb or descent through the vertical limits of the transferring controller's area of jurisdiction, advise the transferring controller of that decision as soon as possible. *You* now have the responsibility to ensure that the necessary coordination is accomplished with any intervening controller(s) whose area of jurisdiction is affected by that delay, unless otherwise specified in a LOA or a facility directive.

*NOTE-*
*Those en route facilities using HOST software that provides capability for passing interim altitude shall include the specific operations and procedures for use of this procedure in a LOA between the appropriate facilities.*

## 5-4-7. POINT OUT

**a.** The transferring controller shall:

**1.** Obtain verbal approval before permitting an aircraft to enter the receiving controller's delegated airspace. *TERMINAL.* Automated approval may be utilized in lieu of verbal, provided the appropriate automation software is operational (automated point out function), and the procedures are specified in a facility directive/LOA.

**2.** Obtain the receiving controller's approval before making any changes to an aircraft's flight path, altitude, or data block information after the point out has been approved.

*NOTE-*
*Those en route facilities using HOST software that provides capability for passing interim altitude shall include the specific operations and procedures for use of this procedure in a LOA between the appropriate facilities.*

**3.** Comply with restrictions issued by the receiving controller unless otherwise coordinated.

**4.** Be responsible for subsequent radar handoffs and communications transfer, including flight data revisions and coordination, unless otherwise agreed to by the receiving controller or as specified in a LOA.

**b.** The receiving controller shall:

**1.** Ensure that the target position corresponds with the position given by the transferring controller or that there is an association between a computer data block and the target being transferred prior to approving a point out.

**2.** Be responsible for separation between point out aircraft and other aircraft for which he/she has separation responsibility.

**3.** Issue restrictions necessary to provide separation from other aircraft within his/her area of jurisdiction.

## 5-4-8. AUTOMATED INFORMATION TRANSFER (AIT)

Transfer radar identification and/or altitude control without verbal coordination under the following conditions:

**a.** During radar handoff; and

**b.** Via information displayed in full data blocks; and

**c.** Within the same facility, except as provided in para 5-4-9, Interfacility Automated Information Transfer; and

**d.** When following procedures specified in your facility AIT directive.

## 5-4-9. INTERFACILITY AUTOMATED INFORMATION TRANSFER

*EN ROUTE*

Transfer radar identification without verbal coordination under the following conditions:

**a.** During radar handoff; and

**b.** Via information displayed in full data blocks; and

**c.** On aircraft at assigned altitude in level flight; and

**d.** Only the first sector within the receiving facility shall utilize the procedure; and

**e.** When following procedures specified in your facility AIT directive and LOA.

# Section 5. Radar Separation

## 5-5-1. APPLICATION

**a.** Radar separation shall be applied to all RNAV aircraft operating on a random (impromptu) route at or below FL 450.

**b.** Radar separation may be applied between:

**1.** Radar identified aircraft.

**2.** An aircraft taking off and another radar identified aircraft when the aircraft taking off will be radar-identified within 1 mile of the runway end.

**3.** A radar-identified aircraft and one not radar-identified when either is cleared to climb/descend through the altitude of the other provided:

**(a)** The performance of the radar system is adequate and, as a minimum, primary radar targets or ASR-9/Full Digital Radar Primary Symbol targets are being displayed on the display being used within the airspace within which radar separation is being applied; and

**(b)** Flight data on the aircraft not radar-identified indicate it is a type which can be expected to give adequate primary/ASR-9/Full Digital Radar Primary Symbol return in the area where separation is applied; and

**(c)** The airspace within which radar separation is applied is not less than the following number of miles from the edge of the radar display:

**(1)** When less than 40 miles from the antenna- *6 miles;*

**(2)** When 40 miles or more from the antenna- *10 miles;*

**(3)** Narrowband radar operations- *10 miles;* and

**(d)** Radar separation is maintained between the radar-identified aircraft and all observed primary, ASR-9/Full Digital Radar Primary Symbol, and secondary radar targets until nonradar separation is established from the aircraft not radar identified; and

**(e)** When the aircraft involved are on the same relative heading, the radar-identified aircraft is vectored a sufficient distance from the route of the aircraft not radar identified to assure the targets are not superimposed prior to issuing the clearance to climb/descend.

***REFERENCE-***
*FAAO 7110.65, Exceptions, Para 4-1-2.*
*FAAO 7110.65, Route Use, Para 4-4-1.*
*FAAO 7110.65, Application, Para 5-3-1.*
*FAAO 7110.65, Additional Separation for Formation Flights, Para 5-5-8.*
*FAAO 7110.65, Approach Separation Responsibility, Para 5-9-5.*

## 5-5-2. TARGET SEPARATION

**a.** Apply radar separation:

**1.** Between the centers of primary radar targets; however, do not allow a primary target to touch another primary target or a beacon control slash.

**2.** Between the ends of beacon control slashes.

***NOTE-***
*At TPX-42 sites, the bracket video feature must be activated to display the beacon control slash.*

**3.** Between the end of a beacon control slash and the center of a primary target.

**4.** All-digital displays. Between the centers of digitized targets. Do not allow digitized targets to touch.

***REFERENCE-***
*FAAO 7110.65, Simultaneous Independent ILS/MLS Approaches- Dual & Triple, Para 5-9-7.*

## 5-5-3. TARGET RESOLUTION

**a.** A process to ensure that correlated radar targets or digitized targets do not touch.

**b.** Mandatory traffic advisories and safety alerts shall be issued when this procedure is used.

***NOTE-***
*This procedure shall not be provided utilizing mosaic radar systems.*

**c.** Target resolution shall be applied as follows:

**1.** Between the edges of two primary targets or the edges of primary digitized targets.

**2.** Between the end of the beacon control slash and the edge of a primary target or primary digitized target.

**3.** Between the ends of two beacon control slashes.

## 5-5-4. MINIMA

Separate aircraft by the following minima:

*NOTE-*
*Wake turbulence procedures specify increased separation minima required for certain classes of aircraft because of the possible effects of wake turbulence.*

**a.** Broadband Radar System or Full Digital Terminal Radar System:

*NOTE-*
1. *Includes single sensor long range radar mode.*

2. *When less than 40 miles from the antenna- 3 miles.*

3. *When 40 miles or more from the antenna- 5 miles.*

*EN ROUTE*

**b.** Stage A/DARC, M-EARTS Mosaic Mode, Terminal Mosaic Mode:

*NOTE-*
*Mosaic Mode combines radar input from 2 to 16 sites into a single picture utilizing a mosaic grid composed of radar sort boxes.*

**1.** Below FL 600- *5 miles.*

**2.** At or above FL 600- *10 miles.*

**3.** For areas meeting all of the following conditions:

**(a)** Radar site adaptation is set to single sensor.

**(b)** Significant operational advantages can be obtained.

**(c)** Within 40 miles of the antenna.

**(d)** Below FL 180.

**(e)** Facility directives specifically define the area where the separation can be applied. Facility directives may specify 3 miles.

*REFERENCE-*
*FAAO 7210.3, Single Site Coverage Stage A Operations, Para 8-2-1.*
*FAAO 7210.3, Single Site Coverage ATTS Operations, Para 11-8-15.*

**4.** When transitioning from terminal to en route control, 3 miles increasing to 5 miles or greater, provided:

**(a)** The aircraft are on diverging routes/courses, and/or

**(b)** The leading aircraft is and will remain faster than the following aircraft; and

**(c)** Separation constantly increasing and the first center controller will establish 5 NM or other appropriate form of separation prior to the aircraft departing the first center sector; and

**(d)** The procedure is covered by a letter of agreement between the facilities involved and limited to specified routes and/or sectors/positions.

**c.** M-EARTS Sensor Mode:

*NOTE-*
1. *Sensor Mode displays information from the radar input of a single site.*

2. *Procedures to convert M-EARTS Mosaic Mode to M-EARTS Sensor Mode at each PVD/MDM will be established by facility directive.*

**1.** When less than 40 miles from the antenna- *3 miles.*

**2.** When 40 miles or more from the antenna- *5 miles.*

*WAKE TURBULENCE APPLICATION*

**d.** Separate aircraft operating directly behind, or directly behind and less than 1,000 feet below, or following an aircraft conducting an instrument approach by:

*NOTE-*
*Consider parallel runways less than 2,500 feet apart as a single runway because of the possible effects of wake turbulence.*

**1.** Heavy behind heavy- *4 miles.*

**2.** Large/heavy behind B757- *4 miles.*

**3.** Small behind B757- *5 miles.*

**4.** Small/large behind heavy - *5 miles.*

*WAKE TURBULENCE APPLICATION*

**e.** *TERMINAL.* In addition to subpara d, separate an aircraft landing behind another aircraft on the same runway, or one making a touch-and-go, stop-and-go, or low approach by ensuring the following minima will exist at the time the preceding aircraft is over the landing threshold:

*NOTE-*
*Consider parallel runways less than 2,500 feet apart as a single runway because of the possible effects of wake turbulence.*

**1.** Small behind large- *4 miles.*

**2.** Small behind B757- *5 miles.*

3. Small behind heavy- *6 miles.*

**f.** *TERMINAL.* 2.5 nautical miles (NM) separation is authorized between aircraft established on the final approach course within 10 NM of the landing runway when operating in single sensor slant range mode and aircraft remains within 40 miles of the antenna and:

1. The leading aircraft's weight class is the same or less than the trailing aircraft;

2. Heavy aircraft and the Boeing 757 are permitted to participate in the separation reduction as the trailing aircraft only;

3. An average runway occupancy time of 50 seconds or less is documented;

4. CTRD's are operational and used for quick glance references;

*REFERENCE-*
*FAAO 7110.65, Use of Tower Radar Displays, Para 3-1-9.*

5. Turnoff points are visible from the control tower.

*REFERENCE-*
*FAAO 7110.65, Wake Turbulence, Para 2-1-19.*
*FAAO 7110.65, Same Runway Separation, Para 3-9-6.*
*FAAO 7110.65, Passing or Diverging, Para 5-5-7.*
*FAAO 7110.65, Separation from Obstructions, Para 5-5-9.*
*FAAO 7110.65, Successive or Simultaneous Departures, Para 5-8-3.*
*FAAO 7110.65, Approach Separation Responsibility, Para 5-9-5.*
*FAAO 7110.65, Sequencing, Para 7-6-7.*
*FAAO 7110.65, Separation, Para 7-7-3.*
*FAAO 7110.65 Separation, Para 7-8-3.*
*FAAO 7210.3, Reduced Separation on Final, Para 10-4-7.*

## 5-5-5. VERTICAL APPLICATION

Aircraft not laterally separated, may be vertically separated by one of the following methods:

**a.** Assign altitudes to aircraft, provided valid Mode C altitude information is monitored and the applicable separation minima is maintained at all times.

*REFERENCE-*
*FAAO 7110.65, Vertical Separation Minima, Para 4-5-1.*
*FAAO 7110.65, Validation of Mode C Readout, Para 5-2-17.*
*FAAO 7110.65, Separation, Para 7-7-3.*
*FAAO 7110.65, Separation, Para 7-8-3.*
*FAAO 7110.65, Separation, Para 7-9-4.*

**b.** Assign an altitude to an aircraft after the aircraft previously at that altitude has been issued a climb/descent clearance and is observed (valid Mode C), or reports leaving the altitude.

*NOTE-*
*1. Consider known aircraft performance characteristics, pilot furnished and/or Mode C detected information which indicate that climb/descent will not be consistent with the rates recommended in the AIM.*

*2. It is possible that the separation minima described in para 4-5-1, Vertical Separation Minima, para 7-7-3, Separation, para 7-8-3, Separation, or para 7-9-4, Separation, might not always be maintained using subpara b. However, correct application of this procedure will ensure that aircraft are safely separated because the first aircraft must have already vacated the altitude prior to the assignment of that altitude to the second aircraft.*

*REFERENCE-*
*FAAO 7110.65, Procedural Preference, Para 2-1-3.*
*FAAO 7110.65, Vertical Separation Minima, Para 4-5-1.*
*FAAO 7110.65, Validation of Mode C Readout, Para 5-2-17.*
*FAAO 7110.65, Application, Para 6-6-1.*

## 5-5-6. EXCEPTIONS

**a.** Do not use Mode C to effect vertical separation with an aircraft on a cruise clearance, contact approach, or as specified in para 5-15-4, System Requirements, subpara e.

*REFERENCE-*
*FAAO 7110.65, Exceptions, Para 6-6-2.*
*FAAO 7110.65, Contact Approach, Para 7-4-6.*
*P/CG Term- Cruise.*

**b.** Assign an altitude to an aircraft only after the aircraft previously at that altitude is observed at or passing through another altitude separated from the first by the appropriate minima when:

1. Severe turbulence is reported.

2. Aircraft are conducting military aerial refueling.

*REFERENCE-*
*FAAO 7110.65, Military Aerial Refueling, Para 9-3-10.*

3. The aircraft previously at that altitude has been issued a climb/descent at pilot's discretion.

## 5-5-7. PASSING OR DIVERGING

**a.** *TERMINAL.* Vertical separation between aircraft may be discontinued when the following conditions are met:

1. Aircraft are on opposite/reciprocal courses and you have observed that they have passed each other; or aircraft are on same or crossing courses and one aircraft has crossed the projected course of the other and the angular difference between their courses is at least 15 degrees.

2. The tracks are monitored to ensure that the primary targets, beacon control slashes, or full digital terminal system primary and/ or beacon target symbols will not touch.

*REFERENCE-*
*FAAO 7110.65, Course Definitions, Para 1-2-2.*

**b.** *EN ROUTE.* Vertical separation between aircraft may be discontinued when they are on opposite courses as defined in para 1-2-2, Course Definitions; and

**1.** You are in communications with both aircraft involved; and

**2.** You tell the pilot of one aircraft about the other aircraft, including position, direction, type; and

**3.** One pilot reports having seen the other aircraft and that the aircraft have passed each other; and

**4.** You have observed that the radar targets have passed each other; and

**5.** You have advised the pilots if either aircraft is classified as a heavy jet/B757 aircraft.

**6.** Although vertical separation may be discontinued, the requirements of para 5-5-4, Minima, subparas d and e must be applied when operating behind a heavy jet/B757.

*EXAMPLE-*
*"Traffic, twelve o'clock, Boeing Seven Twenty Seven, opposite direction. Do you have it in sight?"*

*(If the answer is in the affirmative):*

*"Report passing the traffic."*

*(When pilot reports passing the traffic and the radar targets confirm that the traffic has passed, issue appropriate control instructions.)*

## 5-5-8. ADDITIONAL SEPARATION FOR FORMATION FLIGHTS

Because of the distance allowed between formation aircraft and lead aircraft, additional separation is necessary to ensure the periphery of the formation is adequately separated from other aircraft, adjacent airspace, or obstructions. Provide supplemental separation for formation flights as follows:

**a.** Separate a standard formation flight by adding 1 mile to the appropriate radar separation minima.

*REFERENCE-*
*FAAO 7110.65, Formation Flights, Para 2-1-13.*
*FAAO 7110.65, Application, Para 5-5-1.*
*FAAO 7110.65, Separation, Para 7-7-3.*
*P/CG Term- Formation Flight.*

**b.** Separate two standard formation flights from each other by adding 2 miles to the appropriate separation minima.

**c.** Separate a nonstandard formation flight by applying the appropriate separation minima to the perimeter of the airspace encompassing the nonstandard formation or from the outermost aircraft of the nonstandard formation whichever applies.

**d.** If necessary for separation between a nonstandard formation and other aircraft, assign an appropriate beacon code to each aircraft in the formation or to the first and last aircraft in-trail.

*NOTE-*
*The additional separation provided in para 5-5-8, Additional Separation for Formation Flights, is not normally added to wake turbulence separation when a formation is following a heavier aircraft since none of the formation aircraft are likely to be closer to the heavier aircraft than the lead aircraft (to which the prescribed wake turbulence separation has been applied).*

*REFERENCE-*
*FAAO 7110.65, Military Aerial Refueling, Para 9-3-10.*

## 5-5-9. SEPARATION FROM OBSTRUCTIONS

**a.** Except in En Route Stage A/DARC or Stage A/EDARC, separate aircraft from prominent obstructions depicted on the radar scope (displayed on the video/geo map, scribed on the map overlay, or displayed as a permanent echo) by the following minima:

**1.** When less than 40 miles from the antenna- *3 miles.*

**2.** When 40 miles or more from the antenna- *5 miles.*

**b.** Except in En Route Stage A/DARC or Stage A/EDARC, vertical separation of aircraft above a prominent obstruction displayed as a permanent echo may be discontinued after the aircraft has passed it.

**c.** En Route Stage A/DARC or Stage A/EDARC, apply the radar separation minima specified in para 5-5-4, Minima, subpara b1.

*NOTE-*
*The determination of what constitutes a prominent obstruction is made locally after coordination with appropriate flight standards representatives. Prominent obstructions shall be displayed as permanent echoes on the radar display using parrots, MTI reflectors, or RTQC symbols. Digital map mark (DMM) may be used to mark obstructions. DMM's are not to be used alone for map alignment but in conjunction with one or more of the permanent echo marking devices. When RTQC alone is used for obstruction marking, it shall be certified by airway facilities per the appropriate certification manual.*

## 5-5-10. ADJACENT AIRSPACE

**a.** If coordination between the controllers concerned has not been effected, separate radar-controlled aircraft from the boundary of adjacent airspace in which radar separation is also being used by the following minima:

*REFERENCE-*
*FAAO 7110.65, Coordinate Use of Airspace, Para 2-1-14.*

**1.** When less than 40 miles from the antenna- *1 1/2 miles.*

**2.** When 40 miles or more from the antenna- *2 1/2 miles.*

**3.** En route Stage A/DARC or Stage A/EDARC:

**(a)** Below Flight Level 600- *2 1/2 miles.*

**(b)** Flight Level 600 and above- *5 miles.*

**b.** Separate radar-controlled aircraft from the boundary of airspace in which nonradar separation is being used by the following minima:

**1.** When less than 40 miles from the antenna- *3 miles.*

**2.** When 40 miles or more from the antenna- *5 miles.*

**3.** En route Stage A/DARC or Stage A/EDARC:

**(a)** Below Flight Level 600- *5 miles.*

**(b)** Flight Level 600 and above- *10 miles.*

**c.** The provisions of subparas a and b do not apply to VFR aircraft being provided Class B, Class C, or TRSA services. Ensure that the targets of these aircraft do not touch the boundary of adjacent airspace.

**d.** VFR aircraft approaching Class B, Class C, Class D, or TRSA airspace which is under the control jurisdiction of another air traffic control facility should either be provided with a radar handoff or be advised that radar service is terminated, given their position in relation to the Class B, Class C, Class D, or TRSA airspace, and the ATC frequency, if known, for the airspace to be entered. These actions should be accomplished in sufficient time for the pilot to obtain the required ATC approval prior to entering the airspace involved, or to avoid the airspace.

## 5-5-11. EDGE OF SCOPE

Separate a radar-controlled aircraft climbing or descending through the altitude of an aircraft that has been tracked to the edge of the scope/display by the following minima until nonradar separation has been established:

**a.** When less than 40 miles from the antenna- *3 miles* from edge of scope.

**b.** When 40 miles or more from the antenna- *5 miles* from edge of scope.

**c.** En route Stage A/DARC or Stage A/EDARC:

**1.** Below Flight Level 600- *5 miles.*

**2.** Flight Level 600 and above- *10 miles.*

## 5-5-12. BEACON TARGET DISPLACEMENT

When using a radar target display with a previously specified beacon target displacement to separate a beacon target from a primary target, adjacent airspace, obstructions, or terrain, add a 1 mile correction factor to the applicable minima. The maximum allowable beacon target displacement which may be specified by the facility air traffic manager is 1/2 mile.

*REFERENCE-*
*FAAO 7210.3, Monitoring of Mode 3/A Radar Beacon Codes, Para 3-7-4.*

## 5-5-13. GPA 102/103 CORRECTION FACTOR

When using a radar display whose primary radar video is processed by the GPA 102/103 modification to a joint-use radar system, apply the following correction factors to the applicable minima:

**a.** If less than 40 miles from the antenna- add *1 mile.*

**b.** If 40 miles or more but not over 200 miles from the antenna- add *3 miles.*

# Section 6. Vectoring

## 5-6-1. APPLICATION

Vector aircraft:

**a.** In controlled airspace for separation, safety, noise abatement, operational advantage, or when a pilot requests. Allow aircraft operating on an RNAV route to remain on their own navigation to the extent possible.

**b.** In Class G airspace only upon pilot request and as an additional service.

**c.** At or above the MVA or the minimum IFR altitude except as authorized for radar approaches, special VFR, VFR operations, or by para 5-6-3, Vectors Below Minimum Altitude.

***NOTE-***
*VFR aircraft not at an altitude assigned by ATC may be vectored at any altitude. It is the responsibility of the pilot to comply with the applicable parts of CFR Title 14.*

***REFERENCE-***
*FAAO 7110.65, Minimum En Route Altitudes, Para 4-5-6.*
*FAAO 7110.65, Priority, Para 7-5-2.*
*FAAO 7110.65, Altitude Assignment, Para 7-5-4.*
*FAAO 7110.65, Altitude Assignments, Para 7-7-5.*
*14 CFR Section 91.119, Minimum Safe Altitudes: General.*

**d.** In airspace for which you have control jurisdiction, unless otherwise coordinated.

**e.** So as to permit it to resume its own navigation within radar coverage.

**f.** Operating special VFR only within Class B, Class C, Class D, or Class E surface areas.

**g.** Operating VFR at those locations where a special program is established, or when a pilot requests, or you suggest and the pilot concurs.

***REFERENCE-***
*FAAO 7110.65, Route Use, Para 4-4-1.*
*FAAO 7110.65, Visual Separation, Para 7-2-1.*
*FAAO 7110.65, Separation, Para 7-5-3.*
*FAAO 7110.65, Application, Para 7-6-1.*
*FAAO 7110.65, Separation Minima, Para 9-5-4.*
*FAAO 7210.3, Chapter 11, Section 1, Terminal VFR Radar Services.*

## 5-6-2. METHODS

**a.** Vector aircraft by specifying:

**1.** Direction of turn, if appropriate, and magnetic heading to be flown, or

***PHRASEOLOGY-***
*TURN LEFT/RIGHT HEADING (degrees).*

*FLY HEADING (degrees).*

*FLY PRESENT HEADING.*

*DEPART (fix) HEADING (degrees).*

**2.** The number of degrees, in group form, to turn and the direction of turn, or

***PHRASEOLOGY-***
*TURN (number of degrees) DEGREES LEFT/RIGHT.*

**3.** For NO-GYRO procedures, the type of vector, direction of turn, and when to stop turn.

***PHRASEOLOGY-***
*THIS WILL BE A NO-GYRO VECTOR,*

*TURN LEFT/RIGHT.*

*STOP TURN.*

**b.** When initiating a vector, advise the pilot of the purpose.

***PHRASEOLOGY-***
*VECTOR TO (fix or airway).*

*VECTOR TO INTERCEPT (name of NAVAID) (specified) RADIAL.*

*VECTOR FOR SPACING.*

*VECTOR TO FINAL APPROACH COURSE,*

*or if the pilot does not have knowledge of the type of approach,*

*VECTOR TO (approach name) FINAL APPROACH COURSE.*

***NOTE-***
*Determine optimum routing based on factors such as wind, weather, traffic, pilot requests, noise abatement, adjacent sector requirement, and letters of agreement.*

**c.** Issue with the vector an altitude to maintain and all appropriate altitude restrictions when:

**1.** The vector will take the aircraft off an assigned procedure which contains altitude instructions, i.e., instrument approach, nonradar DP, FMSP, etc..

**2.** The previously issued clearance included crossing restrictions.

*REFERENCE-*
*FAAO 7110.65, Route or Altitude Amendments, Para 4-2-5.*

**d.** If appropriate, advise the pilot what to expect when the vector is completed.

*PHRASEOLOGY-*
*EXPECT TO RESUME (Route, DP, STAR, FMSP, etc.).*

*NOTE-*
*You must ensure that the pilot is made aware if he/she is expected to resume a previously issued rout procedure.*

**e.** Provide radar navigational guidance until the aircraft is:

**1.** Established within the airspace to be protected for the nonradar route to be flown, or

**2.** On a heading that will, within a reasonable distance, intercept the nonradar route to be flown, and

**3.** Informed of its position unless the aircraft is RNAV, FMS, or DME equipped and being vectored toward a VORTAC/TACAN or waypoint and within the service volume of the NAVAID.

*PHRASEOLOGY-*
*(Position with respect to course/fix along route), RESUME OWN NAVIGATION,*

*or*

*FLY HEADING (degrees). WHEN ABLE, PROCEED DIRECT (name of fix),*

*or*

*RESUME ($^{name}/_{number}$FMSP/DP/transition/STAR/procedure).*

*REFERENCE-*
*FAAO 7110.65, Chapter 4, Section 1, NAVAID Use Limitations.*

**f.** Aircraft instructed to resume a procedure which contains restrictions (DP/STAR/FMSP, etc.) shall be issued/reissued all applicable restrictions or shall be advised to comply with those restrictions.

*PHRASEOLOGY-*
*RESUME ($^{name}/_{number}$FMSP/DP/transition/STAR), COMPLY WITH RESTRICTIONS.*

**g.** Aircraft vectored off an RNAV route shall be recleared to the next waypoint or as requested by the pilot.

**h.** During stage A operation, update the route of flight in the computer unless an operational advantage is gained and coordination is accomplished.

**i.** Inform the pilot when a vector will take the aircraft across a previously assigned nonradar route.

*PHRASEOLOGY-*
*EXPECT VECTOR ACROSS (NAVAID radial)(airway/route/course) FOR (purpose).*

*REFERENCE-*
*FAAO 7110.65, Application, Para 7-6-1.*

## 5-6-3. VECTORS BELOW MINIMUM ALTITUDE

Except in en route automated environments in areas where more than 3 miles separation minima is required, you may vector a departing IFR aircraft, or one executing a missed approach, within 40 miles of the antenna and before it reaches the minimum altitude for IFR operations if separation from prominent obstructions shown on the radar scope is applied in accordance with the following:

**a.** If the flight path is 3 miles or more from the obstruction and the aircraft is climbing to an altitude at least 1,000 feet above the obstruction, vector the aircraft to maintain at least 3 miles separation from the obstruction until the aircraft reports leaving an altitude above the obstruction.

**b.** If the flight path is less than 3 miles from the obstruction, and the aircraft is climbing to an altitude at least 1,000 feet above the obstruction, vector the aircraft to increase lateral separation from the obstruction until the 3 mile minimum is achieved or until the aircraft reports leaving an altitude above the obstruction.

**c.** At those locations where diverse vector areas (DVA) have been established, terminal radar facilities may vector aircraft below the MVA/MIA within those areas and along those routes described in facility directives.

*REFERENCE-*
*FAAO 7210.3, Establishing Diverse Vector Area/s (DVA), Para 3-9-5.*

# Section 7. Speed Adjustment

## 5-7-1. APPLICATION

Keep speed adjustments to the minimum necessary to achieve or maintain required or desired spacing. Avoid adjustments requiring alternate decreases and increases. Permit pilots to resume normal speed when previously specified adjustments are no longer needed.

*NOTE-*
*It is the pilot's responsibility and prerogative to refuse speed adjustment that he/she considers excessive or contrary to the aircraft's operating specifications.*

**a.** Consider the following when applying speed control:

**1.** Determine the interval required and the point at which the interval is to be accomplished.

**2.** Implement speed adjustment based on the following principles.

(a) Priority of speed adjustment instructions is determined by the relative speed and position of the aircraft involved and the spacing requirement.

(b) Speed adjustments are not achieved instantaneously. Aircraft configuration, altitudes, and speed determine the time and distance required to accomplish the adjustment.

**3.** Use the following techniques in speed control situations:

(a) Compensate for compression when assigning air speed adjustment in an in-trail situation by using one of the following techniques:

(1) Reduce the trailing aircraft first.

(2) Increase the leading aircraft first.

(b) Assign a specific airspeed if required to maintain spacing.

(c) Allow increased time and distance to achieve speed adjustments in the following situations:

(1) Higher altitudes.

(2) Greater speed.

(3) Clean configurations.

(d) Ensure that aircraft are allowed to operate in a clean configuration as long as circumstances permit.

(e) Keep the number of speed adjustments per aircraft to the minimum required to achieve and maintain spacing.

**b.** Do not assign speed adjustment to aircraft:

**1.** At or above FL 390 without pilot consent.

**2.** Executing a published high altitude instrument approach procedure.

**3.** In a holding pattern.

*REFERENCE-*
*FAAO 7110.65, Holding Instructions, Para 4-6-4.*

**4.** Inside the final approach fix on final or a point 5 miles from the runway, whichever is closer to the runway.

**c.** At the time approach clearance is issued, previously issued speed adjustments shall be restated if required.

**d.** Approach clearances cancel any previously assigned speed adjustment. Pilots are expected to make their own speed adjustments to complete the approach unless the adjustments are restated.

**e.** Express speed adjustments in terms of knots based on indicated airspeed (IAS) in 10-knot increments. At or above FL 240, speeds may be expressed in terms of Mach numbers in 0.01 increments for turbojet aircraft with Mach meters (i.e., Mach 0.69, 0.70, 0.71, etc.).

*NOTE-*
1. *Pilots complying with speed adjustment instructions should maintain a speed within plus or minus 10 knots or 0.02 Mach number of the specified speed.*

2. *When assigning speeds to achieve spacing between aircraft at different altitudes, consider that ground speed may vary with altitude. Further speed adjustment may be necessary to attain the desired spacing.*

*REFERENCE-*
*FAAO 7110.65, Methods, Para 5-7-2.*

## 5-7-2. METHODS

**a.** Instruct aircraft to:

**1.** Maintain present/specific speed.

**2.** Maintain specified speed or greater/less.

**3.** Maintain the highest/lowest practical speed.

**4.** Increase or reduce to a specified speed or by a specified number of knots.

***PHRASEOLOGY-***
*SAY AIRSPEED.*

*SAY MACH NUMBER.*

*MAINTAIN PRESENT SPEED.*

*MAINTAIN (specific speed) KNOTS.*

*MAINTAIN (specific speed) KNOTS OR GREATER.*

*DO NOT EXCEED (speed) KNOTS.*

*MAINTAIN MAXIMUM FORWARD SPEED.*

*MAINTAIN SLOWEST PRACTICAL SPEED.*

*INCREASE/REDUCE SPEED:*

*TO (specified speed in knots),*

*or*

*TO MACH (Mach number),*

*or*

*(number of knots) KNOTS.*

***EXAMPLE-***
"Increase speed to Mach point seven two."
"Reduce speed to two five zero."
"Reduce speed twenty knots."
"Maintain two eight zero knots."
"Maintain maximum forward speed."

***NOTE-***
**1.** *A pilot operating at or above 10,000 feet MSL on an assigned speed adjustment greater than 250 knots is expected to comply with 14 CFR Section 91.117(a) when cleared below 10,000 feet MSL, within domestic airspace, without notifying ATC. Pilots are expected to comply with the other provisions of 14 CFR Section 91.117 without notification.*

**2.** *Speed restrictions of 250 knots do not apply to aircraft operating beyond 12 NM from the coastline within the U.S. Flight Information Region, in offshore Class E airspace below 10,000 feet MSL. However, in airspace underlying a Class B airspace area designated for an airport, or in a VFR corridor designated through such as a Class B airspace area, pilots are expected to comply with the 200 knot speed limit specified in 14 CFR Section 91.117(c). (See 14 CFR Sections 91.117(c) and 91.703.)*

**3.** *The phrases "maintain maximum forward speed" and "maintain slowest practical speed" are primarily intended for use when sequencing a group of aircraft. As the sequencing plan develops, it may be necessary to determine the specific speed and/or make specific speed assignments.*

**b.** To obtain pilot concurrence for a speed adjustment at or above FL 390, as required by para 5-7-1, Application, use the following phraseology.

***PHRASEOLOGY-***
*(Speed adjustment), IF UNABLE ADVISE.*

***EXAMPLE-***
*"Reduce speed to one niner zero, if unable advise."*

**c.** Simultaneous speed reduction and descent can be extremely difficult, particularly for turbojet aircraft. Specifying which action is to be accomplished first removes any doubt the pilot may have as to controller intent or priority. Specify which action is expected first when combining speed reduction with a descent clearance.

**1.** Speed reductions prior to descent.

***PHRASEOLOGY-***
*REDUCE SPEED:*

*TO (specified speed),*

*or*

*(number of knots) KNOTS.*

*THEN, DESCEND AND MAINTAIN (altitude).*

**2.** Speed reduction following descent.

***PHRASEOLOGY-***
*DESCEND AND MAINTAIN (altitude).*

*THEN, REDUCE SPEED:*

*TO (specified speed in knots),*

*or*

*TO MACH (Mach number),*

*or*

*(number of knots) KNOTS.*

***NOTE-***
*When specifying descent prior to speed reduction, consider the maximum speed requirements specified in 14 CFR Section 91.117. It may be necessary for the pilot to level off temporarily and reduce speed prior to descending below 10,000 feet MSL.*

**d.** Specify combined speed/altitude fix crossing restrictions.

***PHRASEOLOGY-***
*CROSS (fix) AT AND MAINTAIN (altitude) AT (specified speed) KNOTS.*

***EXAMPLE-***
*"Cross Robinsville at and maintain six thousand at two three zero knots."*

***REFERENCE-***
*FAAO 7110.65, Numbers Usage, Para 2-4-17.*
*FAAO 7110.65, Altitude Information, Para 4-5-7.*

### 5-7-3. MINIMA

When assigning airspeeds, use the following minima:

**a.** To aircraft operating between FL 280 and 10,000 feet, a speed not less than 250 knots or the equivalent Mach number.

***NOTE-***
**1.** *On a standard day the Mach numbers equivalent to 250 knots CAS (subject to minor variations) are:*
*FL 240-0.6*
*FL 250-0.61*
*FL 260-0.62*
*FL 270-0.64*
*FL 280-0.65*
*FL 290-0.66.*

**2.** *If a pilot is unable to comply with a speed assignment lower than the minima specified in this paragraph, the pilot will advise.*

**b.** To arrival aircraft operating below 10,000 feet:

**1.** Turbojet aircraft. A speed not less than 210 knots; except when the aircraft is within 20 flying miles of the runway threshold of the airport of intended landing, a speed not less than 170 knots.

**2.** Reciprocating engine and turboprop aircraft. A speed not less than 200 knots; except when the aircraft is within 20 flying miles of the runway threshold of the airport of intended landing, a speed not less than 150 knots.

**c.** Departures:

**1.** Turbojet aircraft. A speed not less than 230 knots.

**2.** Reciprocating engine and turboprop aircraft- A speed not less than 150 knots.

**d.** Helicopters. A speed not less than 60 knots.

***REFERENCE-***
*FAAO 7110.65, Methods, Para 5-7-2.*

### 5-7-4. TERMINATION

Advise aircraft when speed adjustment is no longer needed.

***PHRASEOLOGY-***
*RESUME NORMAL SPEED.*

# Section 8. Radar Departures

## 5-8-1. PROCEDURES

Use standard departure routes and channelized altitudes whenever practical to reduce coordination. Do not, however, assign these routes solely to provide for possible radar or communication failure.

## 5-8-2. INITIAL HEADING

Before departure, assign the initial heading to be flown if a departing aircraft is to be vectored immediately after takeoff.

***PHRASEOLOGY-***
*FLY RUNWAY HEADING.*
*TURN LEFT/RIGHT, HEADING (degrees).*

***NOTE-***
*TERMINAL. A purpose for the heading is not necessary, since pilots operating in a radar environment associate assigned headings with vectors to their planned route of flight.*

***REFERENCE-***
*FAAO 7110.65, Departure Clearances, Para 4-3-2.*
*FAAO 7110.65, Vectors Below Minimum Altitude, Para 5-6-3.*

## 5-8-3. SUCCESSIVE OR SIMULTANEOUS DEPARTURES

*TERMINAL*

Separate aircraft departing from the same airport/heliport or adjacent airports/heliports in accordance with the following minima provided radar identification with the aircraft will be established within 1 mile of the takeoff runway end/helipad and courses will diverge by 15 degrees or more.

***NOTE-***
**1.** *FAAO 8260.19, Flight Procedures and Airspace, establishes guidelines for IFR departure turning procedures which assumes a climb to 400 feet above the airport elevation before a turn is commenced. FAAO 8260.3, United States Standard for Terminal Instrument Procedures (TERPS), the ILS missed approach criteria, requires a straight climb of 400 feet be specified where turns greater than 15 degrees are required.*

**2.** *Consider known aircraft performance characteristics when applying initial separation to successive departing aircraft.*

**3.** *When one or both of the departure surfaces is a helipad, use the takeoff course of the helicopter as a reference, comparable to the centerline of a runway and the helipad center as the threshold.*

**a.** Between aircraft departing the same runway/helipad or parallel runways/helicopter takeoff courses separated by less than 2,500 feet- *1 mile* if courses diverge immediately after departure.
(See FIG 5-8-1, FIG 5-8-2, and FIG 5-8-3.)

**Successive Departures**

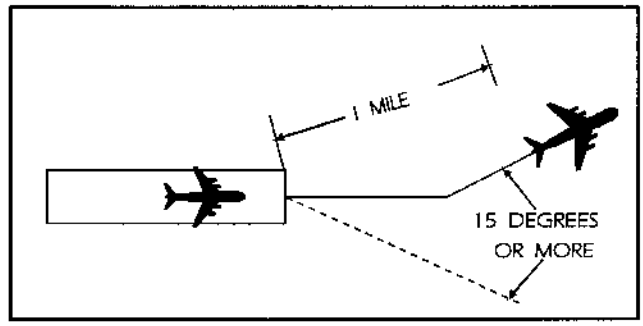



*FIG 5-8-1*

**Simultaneous Departures**

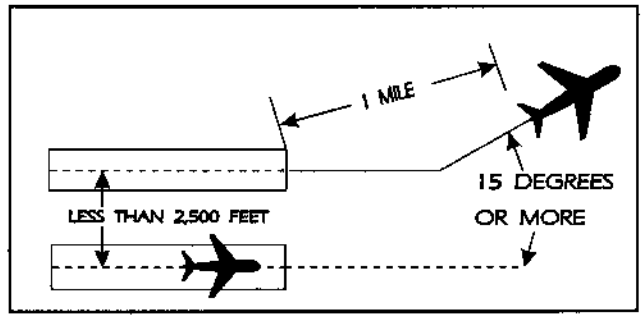



*FIG 5-8-2*

**Simultaneous Departures**

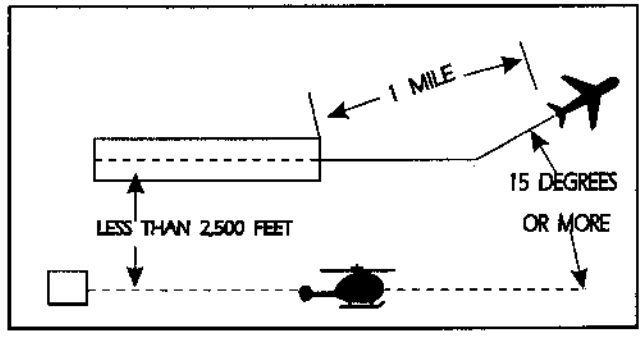



*FIG 5-8-3*

***NOTE-***
*This procedure does not apply when a small aircraft is taking off from an intersection on the same runway behind a large aircraft or when an aircraft is departing behind a heavy jet/B757.*

*REFERENCE-*
*FAAO 7110.65, Wake Turbulence Separation for Intersection Departures, Para 3-9-7.*
*FAAO 7110.65, Intersecting Runway Separation, Para 3-9-8.*
*FAAO 7110.65, Minima, Para 5-5-4.*

**b.** Between aircraft departing from diverging runways:

**1.** Nonintersecting runways. Authorize simultaneous takeoffs if runways diverge by 15 degrees or more. (See FIG 5-8-4.)

**Nonintersecting Runway Departures**

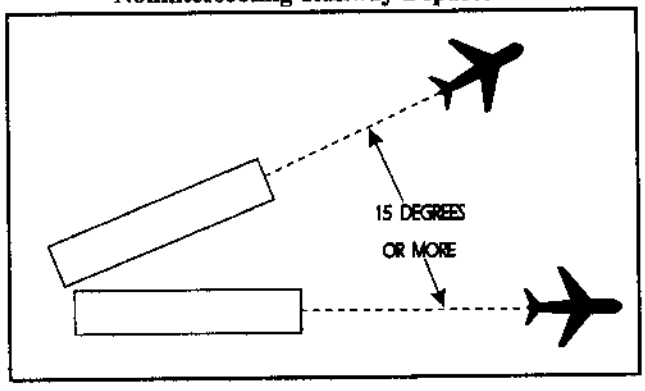



*FIG 5-8-4*

**2.** Intersecting runways and/or helicopter takeoff courses which diverge by 15 degrees or more. Authorize takeoff of a succeeding aircraft when the preceding aircraft has passed the point of runway and/or takeoff course intersection. When applicable, apply the procedure in para 3-9-5, Anticipating Separation. (See FIG 5-8-5 and FIG 5-8-6.)

**Intersecting Runway Departures**

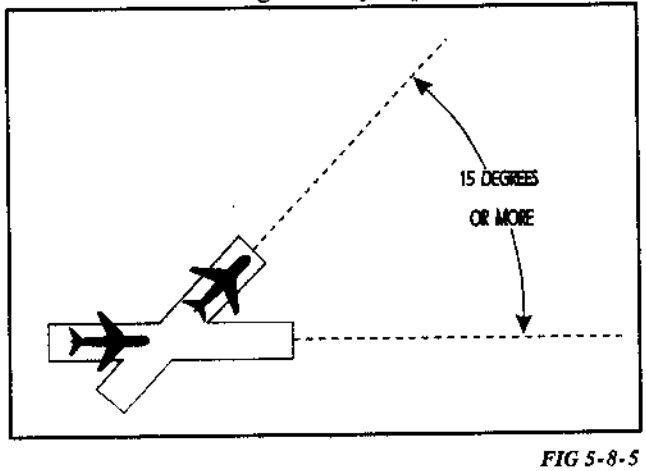



*FIG 5-8-5*

*NOTE-*
*This procedure does not apply when aircraft are departing behind a heavy jet/B757.*

**c.** Between aircraft departing in the same direction from parallel runways/helicopter takeoff courses. Authorize simultaneous takeoffs if the centerlines/takeoff courses are separated by at least 2,500 feet and courses diverge by 15 degrees or more immediately after departure. (See FIG 5-8-7 and FIG 5-8-8.)

**Intersecting Helicopter Course Departures**

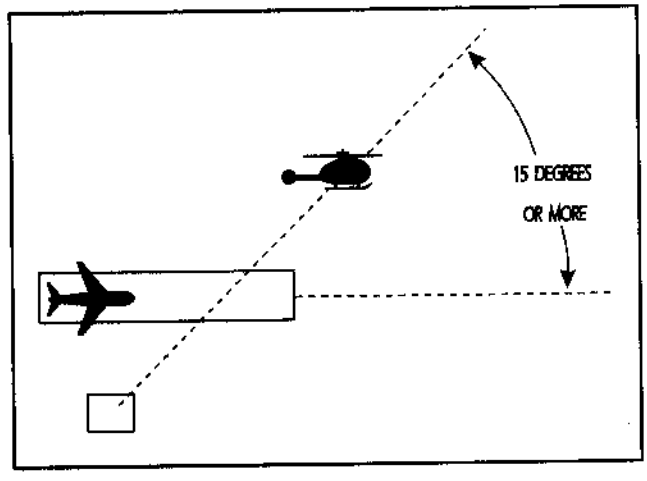



*FIG 5-8-6*

**Parallel Runway Departures**

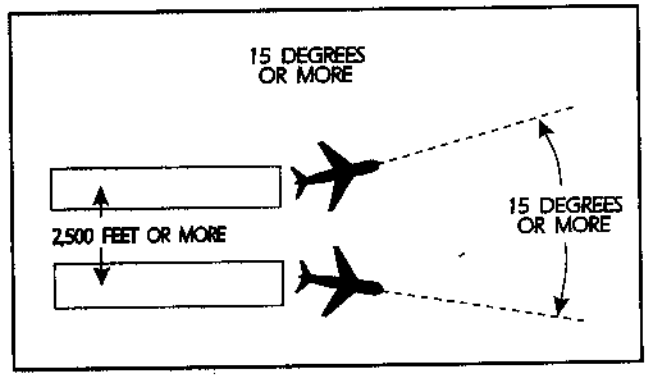



*FIG 5-8-7*

**Parallel Helicopter Course Departures**

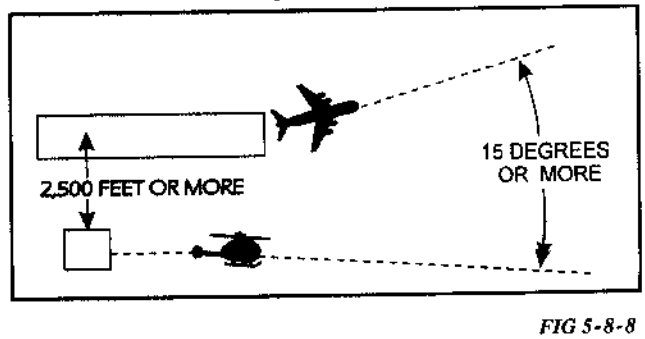



*FIG 5-8-8*

## 5-8-4. DEPARTURE AND ARRIVAL

*TERMINAL.* Except as provided in para 5-8-5, Departures and Arrivals on Parallel or Nonintersecting Diverging Runways, separate a departing aircraft from an arriving aircraft on final approach by a minimum of *2 miles* if separation will increase to a minimum of 3 miles (5 miles when 40 miles or more from the antenna) within 1 minute after takeoff.

*NOTE-*

**1.** *This procedure permits a departing aircraft to be released so long as an arriving aircraft is no closer than 2 miles from the runway at the time. This separation is determined at the time the departing aircraft commences takeoff roll.*

**2.** *Consider the effect surface conditions, such as ice, snow, and other precipitation, may have on known aircraft performance characteristics, and the influence these conditions may have on the pilot's ability to commence takeoff roll in a timely manner.*

## 5-8-5. DEPARTURES AND ARRIVALS ON PARALLEL OR NONINTERSECTING DIVERGING RUNWAYS

*TERMINAL.* Authorize simultaneous operations between an aircraft departing on a runway and an aircraft on final approach to another parallel or nonintersecting diverging runway if the departure course diverges immediately by at least 30 degrees from the missed approach course until separation is applied and provided one of the following conditions are met:

*NOTE-*

*When one or both of the takeoff/landing surfaces is a helipad, consider the helicopter takeoff course as the runway centerline and the helipad center as the threshold.*

**a.** When parallel runway thresholds are even, the runway centerlines are at least 2,500 feet apart. (See FIG 5-8-9 and FIG 5-8-10.)

**Parallel Thresholds are Even**

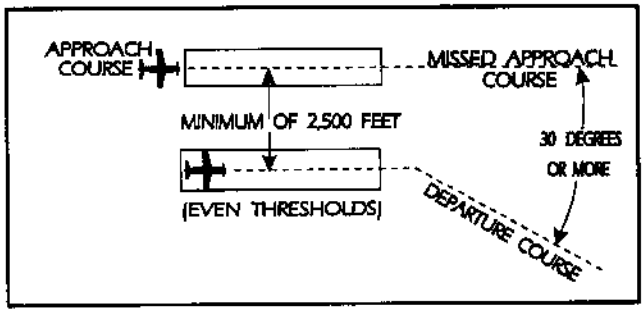



*FIG 5-8-9*

**Parallel Thresholds are Even**

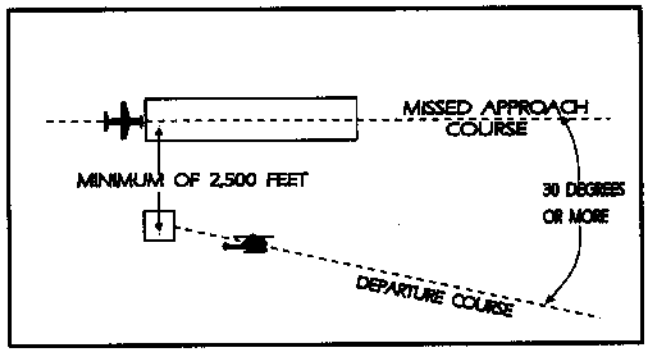



*FIG 5-8-10*

**b.** When parallel runway thresholds are staggered and:

**1.** The arriving aircraft is approaching the nearer runway: the centerlines are at least 1,000 feet apart and the landing thresholds are staggered at least 500 feet for each 100 feet less than 2,500 the centerlines are separated. (See FIG 5-8-11 and FIG 5-8-12.)

**Parallel Thresholds are Staggered**

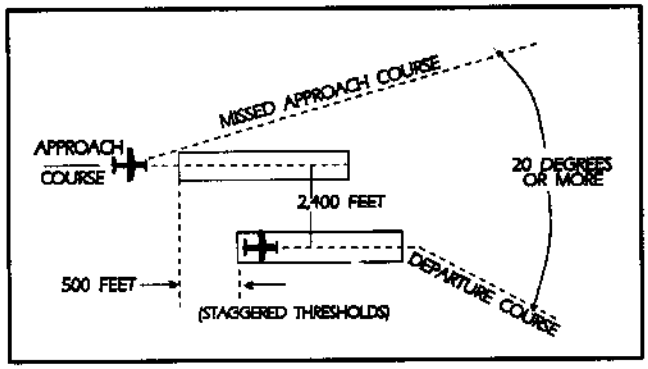



*FIG 5-8-11*

**Parallel Thresholds are Staggered**

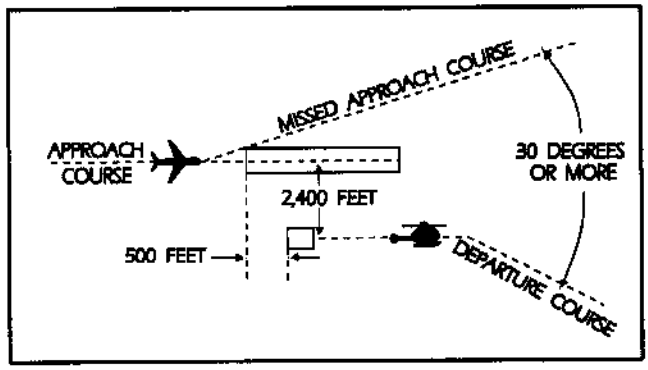



*FIG 5-8-12*

*NOTE-*
*In the event of a missed approach by a heavy jet/B757, apply the procedures in para 3-9-6, Same Runway Separation, or para 3-9-8, Intersecting Runway Separation, ensure that the heavy jet does not overtake or cross in front of an aircraft departing from the adjacent parallel runway.*

2. The arriving aircraft is approaching the farther runway: the runway centerlines separation exceeds 2,500 feet by at least 100 feet for each 500 feet the landing thresholds are staggered. (See FIG 5-8-13.)

**Parallel Thresholds are Staggered**

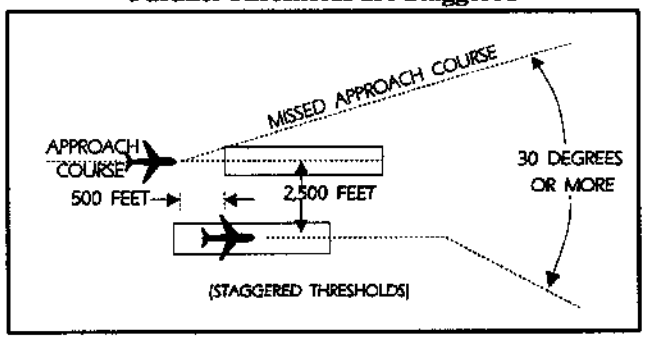



*FIG 5-8-13*

c. When nonintersecting runways diverge by 15 degrees or more and runway edges do not touch. (See FIG 5-8-14.)

**Diverging Nonintersecting Runways**

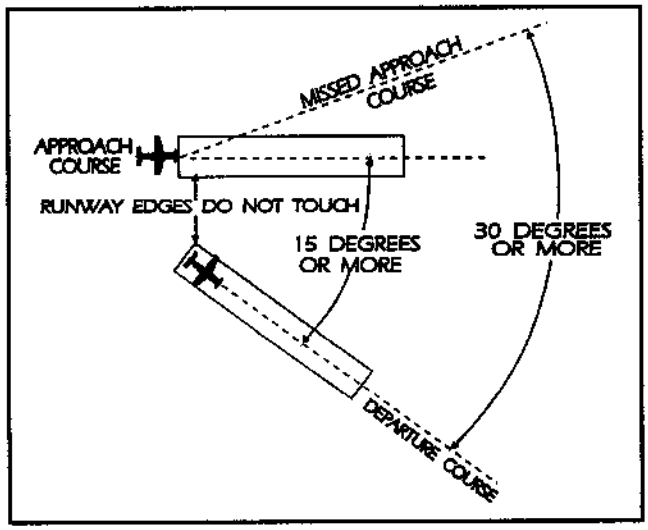



*FIG 5-8-14*

d. When the aircraft on takeoff is a helicopter, hold the helicopter until visual separation is possible or apply the separation criteria in subparas a, b, or c.

*REFERENCE-*
*FAAO 7110.65, Departure and Arrival, Para 5-8-4.*

# Section 9. Radar Arrivals

## 5-9-1. VECTORS TO FINAL APPROACH COURSE

Except as provided in para 7-4-2, Vectors for Visual Approach, vector arriving aircraft to intercept the final approach course:

**a.** At least 2 miles outside the approach gate unless one of the following exists:

**1.** When the reported ceiling is at least 500 feet above the MVA/MIA and the visibility is at least 3 miles (report may be a PIREP if no weather is reported for the airport), aircraft may be vectored to intercept the final approach course closer than 2 miles outside the approach gate but no closer than the approach gate.

**2.** If specifically requested by the pilot, aircraft may be vectored to intercept the final approach course inside the approach gate but no closer than the final approach fix.

**b.** For a precision approach, at an altitude not above the glideslope/glidepath or below the minimum glideslope intercept altitude specified on the approach procedure chart.

**c.** For a nonprecision approach, at an altitude which will allow descent in accordance with the published procedure.

*NOTE-*
*A pilot request for an "evaluation approach," or a "coupled approach," or use of a similar term, indicates the pilot desires the application of subparas a and b.*

**d.** *EN ROUTE.* The following provisions are required before an aircraft may be vectored to the final approach course:

**1.** The approach gate and a line (solid or broken), depicting the final approach course starting at or passing through the approach gate and extending away from the airport, be displayed on the radar scope; for a precision approach, the line length shall extend at least the maximum range of the localizer; for a nonprecision approach, the line length shall extend at least 10NM outside the approach gate; and

**2.** The maximum range selected on the radar display is 150 NM; or

**3.** An adjacent radar display is set at 125 NM or less, configured for the approach in use, and is utilized for the vector to the final approach course.

**4.** If unable to comply with subparas 1, 2, or 3 above, issue the clearance in accordance with para 4-8-1, Approach Clearance.

***REFERENCE-***
*FAAO 7110.65, Approach Clearance, Para 4-8-1.*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*

## 5-9-2. FINAL APPROACH COURSE INTERCEPTION

**a.** Assign headings that will permit final approach course interception on a track that does not exceed the interception angles specified in the TBL 5-9-1.

**Approach Course Interception Angle**

| *Distance from interception point to approach gate* | *Maximum interception angle* |
|---|---|
| Less than 2 miles or triple simultaneous ILS/MLS approaches in use | 20 degrees |
| 2 miles or more | 30 degrees<br>(45 degrees for helicopters) |

*TBL 5-9-1*

**b.** If deviations from the final approach course are observed after initial course interception, apply the following:

**1.** Outside the approach gate: apply procedures in accordance with subpara a, if necessary, vector the aircraft for another approach.

**2.** Inside the approach gate: inform the pilot of the aircraft's position and ask intentions.

***PHRASEOLOGY-***
*(Ident) (distance) MILE(S) FROM THE AIRPORT, (distance) MILE(S) RIGHT/LEFT OF COURSE, SAY INTENTIONS.*

*NOTE-*
*The intent is to provide for a track course intercept angle judged by the controller to be no greater than specified by this procedure.*

***REFERENCE-***
*FAAO 7110.65, Chapter 5, Section 9, Radar Arrivals, and Section 10, Radar Approaches- Terminal.*

**c.** *EN ROUTE.* When using a radar scope range above 125 NM, the controller shall solicit and receive a pilot report that the aircraft is established on the final approach course. If the pilot has not reported established by the final approach gate, inform the pilot of his/her observed position and ask intentions.

*NOTE-*
*It may be difficult to accurately determine small distances when using very large range settings.*

## 5-9-3. VECTORS ACROSS FINAL APPROACH COURSE

Inform the aircraft whenever a vector will take it across the final approach course and state the reason for such action.

*NOTE-*
*In the event you are unable to so inform the aircraft, the pilot is not expected to turn inbound on the final approach course unless approach clearance has been issued.*

*PHRASEOLOGY-*
*EXPECT VECTORS ACROSS FINAL FOR (purpose).*

*EXAMPLE-*
*"EXPECT VECTORS ACROSS FINAL FOR SPACING."*

*REFERENCE-*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*

## 5-9-4. ARRIVAL INSTRUCTIONS

Issue all of the following to an aircraft before it reaches the approach gate:

**a.** Position relative to a fix on the final approach course. If none is portrayed on the radar display or if none is prescribed in the procedure, issue position information relative to the navigation aid which provides final approach guidance or relative to the airport.

**b.** Vector to intercept the final approach course if required.

**c.** Approach clearance except when conducting a radar approach. Issue approach clearance only after the aircraft is:

**1.** Established on a segment of a published route or instrument approach procedure, or see FIG 5-9-1 Example 1.

**2.** Assigned an altitude to maintain until the aircraft is established on a segment of a published route or instrument approach procedure.
(See FIG 5-9-2 thru FIG 5-9-4.)

**Arrival Instructions**

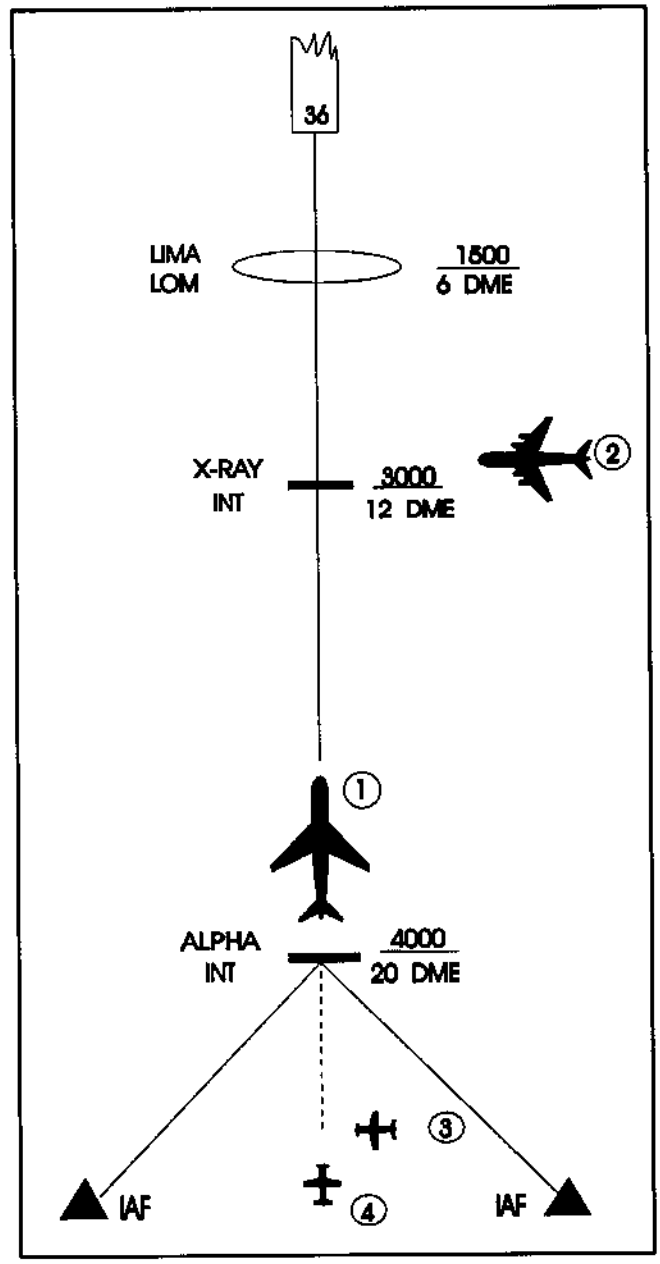



*FIG 5-9-1*

*EXAMPLE-*
1. *Aircraft 1 was vectored to the final approach course but clearance was withheld. It is now at 4,000 feet and established on a segment of the instrument approach procedure. "Seven miles from X-RAY. Cleared I-L-S runway three six approach." (See FIG 5-9-1.)*

2. *Aircraft 2 is being vectored to a published segment of the final approach course, 4 miles from LIMA at 2,000 feet. The MVA for this area is 2,000 feet. "Four miles from LIMA. Turn right heading three four zero. Maintain two thousand until established on the localizer. Cleared I-L-S runway three six approach." (See FIG 5-9-1.)*

**3.** *Aircraft 3 is being vectored to intercept the final approach course beyond the approach segments, 5 miles from Alpha at 5,000 feet. the MVA for this area is 4,000 feet. "Five miles from Alpha. Turn right heading three three zero. Cross Alpha at or above four thousand. Cleared I-L-S runway three six approach." (See FIG 5-9-1.)*

**4.** *Aircraft 4 is established on the final approach course beyond the approach segments, 8 miles from Alpha at 6,000 feet. The MVA for this area is 4,000 feet. "Eight miles from Alpha. Cross Alpha at or above four thousand. Cleared I-L-S runway three six approach." (See FIG 5-9-1.)*

**Arrival Instructions**

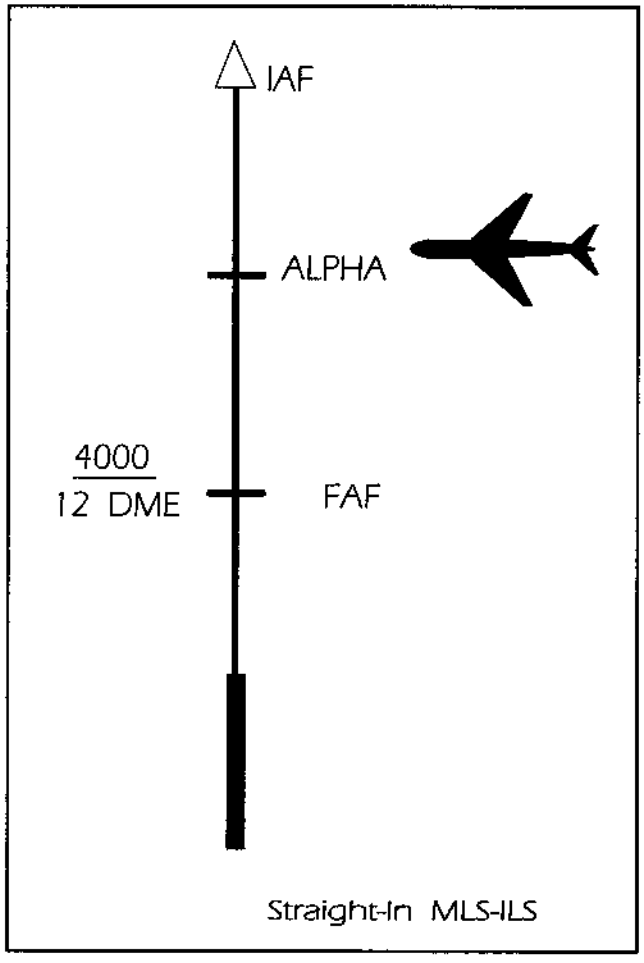



***FIG 5-9-2***

***EXAMPLE-***
*The aircraft is being vectored to a published segment of the MLS final approach course, 3 miles from Alpha at 4,000 feet. The MVA for this area is 4,000 feet. "Three miles from Alpha. Turn left heading two one zero. Maintain four thousand until established on the azimuth course. Cleared M-L-S runway one eight approach." (See FIG 5-9-2.)*

**Arrival Instructions**

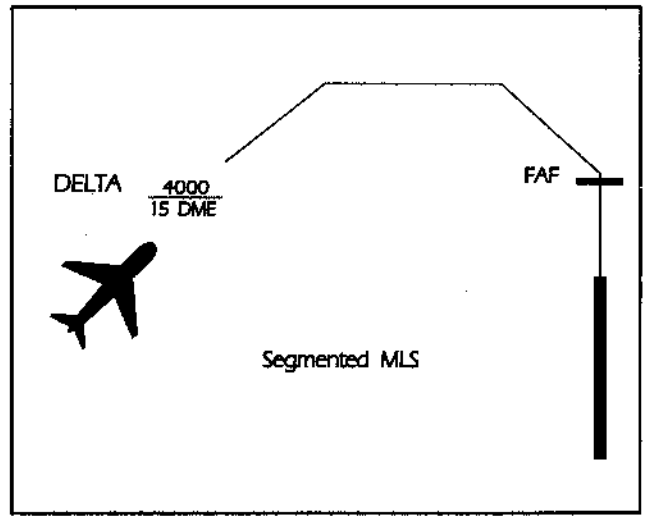



***FIG 5-9-3***

***EXAMPLE-***
*The aircraft is en route to Delta waypoint at 6,000 feet. The MVA for this area is 4,000 feet. "Cross Delta at or above four thousand. Cleared M-L-S runway one eight approach." (See FIG 5-9-3.)*

**Arrival Instructions**

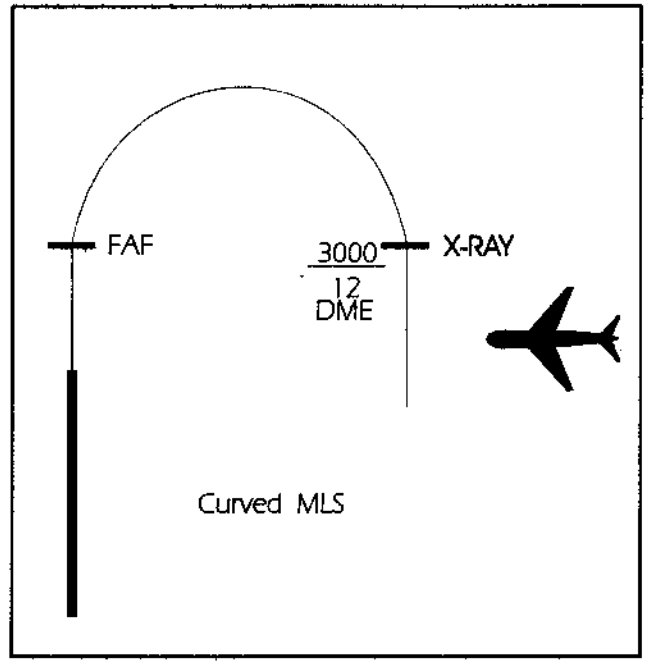



***FIG 5-9-4***

***EXAMPLE-***
*The aircraft is being vectored to an MLS curved approach, 3 miles from X-ray at 3,000 feet. "Three miles from X-ray. Turn right heading three three zero. Maintain three thousand until established on the azimuth course. Cleared M-L-S runway one eight approach." (See FIG 5-9-4.)*

*NOTE-*
*1. The altitude assigned must assure IFR obstruction clearance from the point at which the approach clearance is issued until established on a segment of a published route or instrument approach procedure.*

*2. If the altitude assignment is VFR-on-top, it is conceivable that the pilot may elect to remain high until arrival over the final approach fix which may require the pilot to circle to descend so as to cross the final approach fix at an altitude that would permit landing.*

**d.** Instructions to do one of the following:

*NOTE-*
*The principal purpose of this paragraph is to ensure that frequency changes are made prior to passing the final approach fix. However, at times it will be desirable to retain an aircraft on the approach control frequency to provide a single-frequency approach or other radar services. When this occurs, it will be necessary to relay tower clearances or instructions to preclude changing frequencies prior to landing or approach termination.*

**1.** Monitor local control frequency, reporting to the tower when over the approach fix.

**2.** Contact the tower on local control frequency.

*REFERENCE-*
*FAAO 7110.65, Communications Release, Para 4-8-8.*

**3.** Contact the final controller on the appropriate frequency if radar service will be provided on final on a different frequency.

*REFERENCE-*
*FAAO 7110.65, Final Controller Changeover, Para 5-10-8.*

**4.** When radar is used to establish the final approach fix, inform the pilot that after being advised that he/she is over the fix he/she is to contact the tower on local control frequency.

*EXAMPLE-*
*"Three miles from final approach fix. Turn left heading zero one zero. Maintain two thousand until established on the localizer. Cleared I-L-S runway three six approach. I will advise when over the fix."*

*"Over final approach fix. Contact tower one one eight point one."*

*NOTE-*
*ARSR may be used for establishment of initial approach and intermediate approach fixes only. ASR must be used to establish the final approach fix.*

*REFERENCE-*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Simultaneous Independent ILS/MLS Approaches- Dual & Triple, Para 5-9-7.*

**e.** Where a Terminal Arrival Area (TAA) has been established to support RNAV approaches, inform the aircraft of its position relative to the appropriate IAF and issue the approach clearance. (See FIG 5-9-5.)

*EXAMPLE-*
*1. Aircraft 1: The aircraft is in the straight in area of the TAA. "Seven miles from CENTR, Cleared R-NAV Runway One Eight Approach."*

*2. Aircraft 2: The aircraft is in the left base area of the TAA. "Fifteen miles from LEFTT, Cleared GPS Runway One Eight Approach."*

*3. Aircraft 3: The aircraft is in the right base area of the TAA. "Four miles from WRITE, Cleared FMS Runway One Eight Approach."*

## 5-9-5. APPROACH SEPARATION RESPONSIBILITY

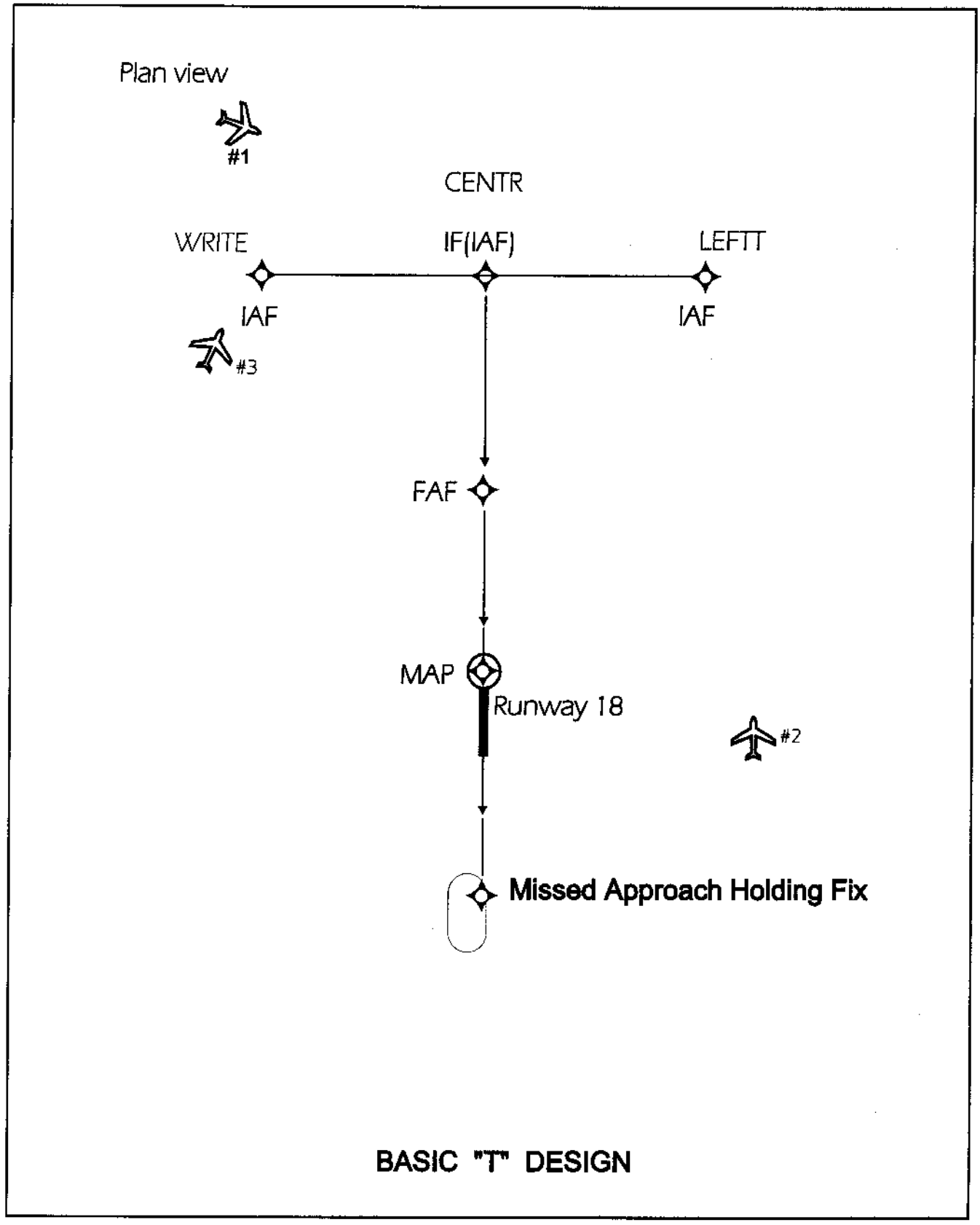
**a.** The radar controller performing the approach control function is responsible for separation of radar arrivals unless visual separation is provided by the tower, or a letter of agreement/facility directive authorizes otherwise. Radar final controllers ensure that established separation is maintained between aircraft under their control and other aircraft established on the same final approach course.

*NOTE-*
*The radar controller may be a controller in an ARTCC, a terminal facility, or a tower controller when authorized to perform the approach control function in a terminal area.*

*REFERENCE-*
*FAAO 7110.65, Wake Turbulence, Para 2-1-19.*
*FAAO 7110.65, Section 5, Radar Separation, Application, Para 5-5-1.*
*FAAO 7110.65, Visual Separation, Para 7-2-1.*
*FAAO 7110.65, Minima, Para 5-5-4.*
*FAAO 7210.3, Authorization for Separation Services by Towers, Para 2-1-14.*

**b.** When timed approaches are being conducted, the radar controller shall maintain the radar separation specified in para 6-7-5, Interval Minima, until the aircraft is observed to have passed the final approach fix inbound (nonprecision approaches) or the OM or the fix used in lieu of the outer marker (precision approaches) and is within 5 miles of the runway on the final approach course or until visual separation can be provided by the tower.

*REFERENCE-*
*FAAO 7110.65, Receiving Controller Handoff, Para 5-4-6.*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Parallel Dependent ILS/MLS Approaches, Para 5-9-6.*
*FAAO 7110.65, Approach Sequence, Para 6-7-2.*




**BASIC "T" DESIGN**

*FIG 5-9-5*

## 5-9-6. PARALLEL DEPENDENT ILS/MLS APPROACHES

*TERMINAL*

**a.** Apply the following minimum separation when conducting parallel dependent ILS, MLS, or ILS and MLS approaches:

**1.** Provide a minimum of 1,000 feet vertical or a minimum of 3 miles radar separation between aircraft during turn on.

**2.** Provide a minimum of 1.5 miles radar separation diagonally between successive aircraft on adjacent localizer/azimuth courses when runway centerlines are at least 2,500 feet but no more than 4,300 feet apart.

**Parallel Dependent ILS/MLS Approaches**

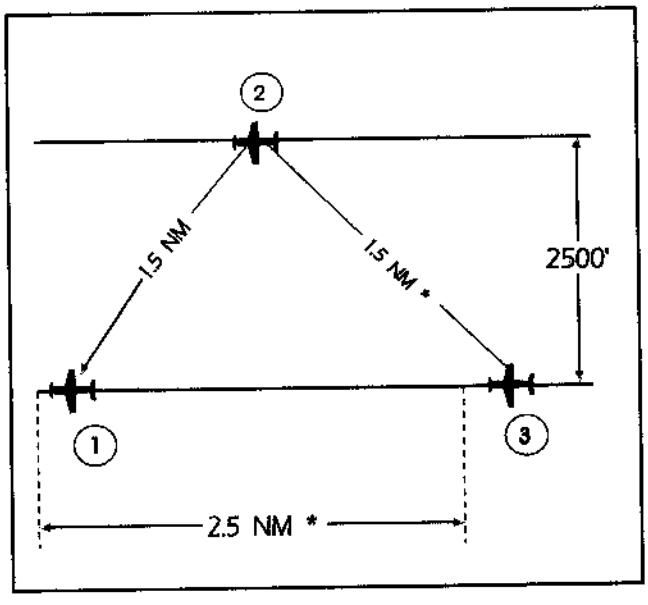



*FIG 5-9-6*

***EXAMPLE-***
*In FIG 5-9-6, Aircraft 2 is 1.5 miles from Aircraft 1, and Aircraft 3 is 1.5 miles or more from Aircraft 2. The resultant separation between Aircrafts 1 and 3 is at least 2.5 miles.*

**3.** Provide a minimum of 2 miles radar separation diagonally between successive aircraft on adjacent localizer/azimuth courses where runway centerlines are more than 4,300 feet but no more than 9,000 feet apart.

**Parallel Dependent ILS/MLS Approaches**

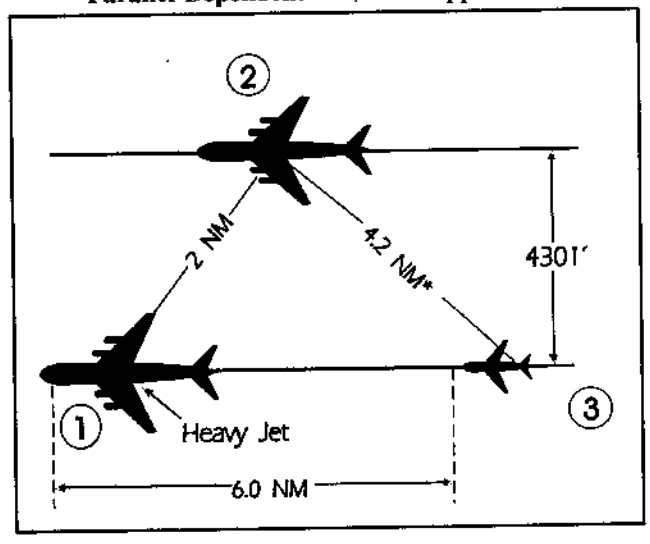



*FIG 5-9-7*

***EXAMPLE-***
*In FIG 5-9-7, Aircraft 2 is 2 miles from heavy Aircraft 1. Aircraft 3 is a small aircraft and is 6 miles from Aircraft 1. *The resultant separation between Aircrafts 2 and 3 is 4.2 miles.*

**4.** Provide the minimum applicable radar separation between aircraft on the same final approach course.

***REFERENCE-***
*FAAO 7110.65, Section 5, Radar Separation, Minima, Para 5-5-4.*

**b.** The following conditions are required when applying the minimum radar separation on adjacent localizer/azimuth courses allowed in subpara a:

**1.** Apply this separation standard only after aircraft are established on the parallel final approach course.

**2.** Straight-in landings will be made.

**3.** Missed approach procedures do not conflict.

**4.** Aircraft are informed that approaches to both runways are in use. This information may be provided through the ATIS.

**5.** Approach control shall have the interphone capability of communicating directly with the local controller at locations where separation responsibility has not been delegated to the tower.

***NOTE-***
*The interphone capability is an integral part of this procedure when approach control has the sole separation responsibility.*

***REFERENCE-***
*FAAO 7110.65, Approach Separation Responsibility, Para 5-9-5.*
*FAAO 7210.3, Authorization for Separation Services by Towers, Para 2-1-14.*

**c.** Consideration should be given to known factors that may in any way affect the safety of the instrument approach phase of flight, such as surface wind direction and velocity, wind shear alerts/reports, severe weather activity, etc. Closely monitor weather activity that could impact the final approach course. Weather conditions in the vicinity of the final approach course may dictate a change of approach in use.

*REFERENCE-*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*

## 5-9-7. SIMULTANEOUS INDEPENDENT ILS/MLS APPROACHES- DUAL & TRIPLE

*TERMINAL*

**a.** Apply the following minimum separation when conducting simultaneous independent ILS, MLS, or ILS and MLS approaches:

**1.** Provide a minimum of 1,000 feet vertical or a minimum of 3 miles radar separation between aircraft during turn-on to parallel final approach.

*NOTE-*
**1.** *During triple parallel approaches, no two aircraft will be assigned the same altitude during turn-on. All three aircraft will be assigned altitudes which differ by a minimum of 1,000 feet. Example: 3,000, 4,000, 5,000; 7,000, 8,000, 9,000.*

**2.** *Communications transfer to the tower controller's frequency shall be completed prior to losing vertical separation between aircraft.*

**2.** Dual parallel runway centerlines are at least 4,300 feet apart.

**3.** Triple parallel runway centerlines are at least 5,000 feet apart and the airport field elevation is less than 1,000 feet MSL.

**4.** A high-resolution color monitor with alert algorithms, such as the final monitor aid or that required in the precision runway monitor program shall be used to monitor approaches where:

**(a)** Triple parallel runway centerlines are at least 4,300 but less than 5,000 feet apart and the airport field elevation is less than 1,000 feet MSL.

**(b)** Triple parallel approaches to airports where the airport field elevation is 1,000 feet MSL or more require the high resolution color monitor with alert algorithms and an approved FAA aeronautical study.

**5.** Provide the minimum applicable radar separation between aircraft on the same final approach course.

*REFERENCE-*
*FAAO 7110.65, Minima, Para 5-5-4.*

**b.** The following conditions are required when applying the minimum separation on adjacent dual or triple ILS/MLS courses allowed in subpara a:

**1.** Straight-in landings will be made.

**2.** ILS, MLS, radar, and appropriate frequencies are operating normally.

**3.** Inform aircraft that simultaneous ILS/MLS approaches are in use prior to aircraft departing an outer fix. This information may be provided through the ATIS.

**4.** Clear the aircraft to descend to the appropriate glideslope/glidepath intercept altitude soon enough to provide a period of level flight to dissipate excess speed. Provide at least 1 mile of straight flight prior to the final approach course intercept.

*NOTE-*
*Not applicable to curved and segmented MLS approaches.*

**5.** An NTZ at least 2,000 feet wide is established an equal distance between extended runway final approach courses and shall be depicted on the monitor display. The primary responsibility for navigation on the final approach course rests with the pilot. Control instructions and information are issued only to ensure separation between aircraft and to prevent aircraft from penetrating the NTZ.

**6.** Monitor all approaches regardless of weather. Monitor local control frequency to receive any aircraft transmission. Issue control instructions as necessary to ensure aircraft do not enter the NTZ.

*NOTE-*
**1.** *Separate monitor controllers, each with transmit/receive and override capability on the local control frequency, shall ensure aircraft do not penetrate the depicted NTZ. Facility directives shall define responsibility for providing the minimum applicable longitudinal separation between aircraft on the same final approach course.*

**2.** *The aircraft is considered the center of the primary radar return for that aircraft, or, if an FMA or other color final monitor aid is used, the center of the digitized target of that aircraft, for the purposes of ensuring an aircraft does not penetrate the NTZ. The provisions of para 5-5-2, Target Separation, apply also.*

**c.** The following procedures shall be used by the final monitor controllers:

**1.** Instruct the aircraft to return to the correct final approach course when aircraft are observed to overshoot the turn-on or to continue on a track which will penetrate the NTZ.

*PHRASEOLOGY-*
*YOU HAVE CROSSED THE FINAL APPROACH COURSE. TURN (left/right) IMMEDIATELY AND RETURN TO LOCALIZER/AZIMUTH COURSE,*

*or*

*TURN (left/right) AND RETURN TO THE LOCALIZER/AZIMUTH COURSE.*

**2.** Instruct aircraft on the adjacent final approach course to alter course to avoid the deviating aircraft when an aircraft is observed penetrating or in the controller's judgement will penetrate the NTZ.

*PHRASEOLOGY-*
*TRAFFIC ALERT, (call sign), TURN (right/left) IMMEDIATELY HEADING (degrees), CLIMB AND MAINTAIN (altitude).*

**3.** Terminate radar monitoring when one of the following occurs:

**(a)** Visual separation is applied.

**(b)** The aircraft reports the approach lights or runway in sight.

**(c)** The aircraft is 1 mile or less from the runway threshold, if procedurally required and contained in facility directives.

**4.** Do not inform the aircraft when radar monitoring is terminated.

**5.** Do not apply the provisions of para 5-13-1, Monitor on PAR Equipment, for simultaneous ILS, MLS, or ILS and MLS approaches.

**d.** Consideration should be given to known factors that may in any way affect the safety of the instrument approach phase of flight when simultaneous ILS, MLS, or ILS and MLS approaches are being conducted to parallel runways. Factors include but are not limited to wind direction/velocity, wind-shear alerts/reports, severe weather activity, etc. Closely monitor weather activity that could impact the final approach course. Weather conditions in the vicinity of the final approach course may dictate a change of approach in use.

*REFERENCE-*
*FAAO 7110.65, Radar Service Termination, Para 5-1-13.*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*

## 5-9-8. SIMULTANEOUS INDEPENDENT DUAL ILS/MLS APPROACHES- HIGH UPDATE RADAR

*TERMINAL*

**a.** Authorize simultaneous independent ILS, MLS, or ILS and MLS approaches to parallel dual runways with centerlines separated by at least 3,000 feet with one localizer offset by 2.5 degrees using a precision runway monitor system with a 1.0 second radar update system and when centerlines are separated by 3,400 to 4,300 feet when precision runway monitors are utilized with a radar update rate of 2.4 seconds or less; and

**1.** Provide a minimum of 1,000 feet vertical or a minimum of 3 miles radar separation between aircraft during turn-on to parallel final approach.

*NOTE-*
*Communications transfer to the tower controller's frequency shall be completed prior to losing vertical separation between aircraft.*

**2.** Provide the minimum applicable radar separation between aircraft on the same final approach course.

*REFERENCE-*
*FAAO 7110.65, Minima, Para 5-5-4.*

**b.** The following conditions are required when applying the minimum separation on dual ILS/MLS courses allowed in subpara a:

**1.** Straight-in landings will be made.

**2.** ILS, MLS, radar, and appropriate frequencies are operating normally.

**3.** Inform aircraft that closely spaced simultaneous ILS/MLS approaches are in use prior to aircraft departing an outer fix. This information may be provided through the ATIS.

**4.** Clear the aircraft to descend to the appropriate glideslope/glidepath intercept altitude soon enough to provide a period of level flight to dissipate excess speed. Provide at least 1 mile of straight flight prior to the final approach course intercept.

*NOTE-*
*Not applicable to curved and segmented MLS approaches.*

**5.** An NTZ at least 2,000 feet wide is established an equal distance between extended runway final approach courses and shall be depicted on the monitor display. The primary responsibility for navigation on the final approach course rests with the pilot. Control instructions and information are issued only to ensure separation between aircraft and to prevent aircraft from penetrating the NTZ.

**6.** Monitor all approaches regardless of weather. Monitor local control frequency to receive any aircraft transmission. Issue control instructions as necessary to ensure aircraft do not enter the NTZ.

**7.** Separate monitor controllers, each with transmit/receive and override capability on the local control frequency, shall ensure aircraft do not penetrate the depicted NTZ. Facility directives shall define the responsibility for providing the minimum applicable longitudinal separation between aircraft on the same final approach course.

***NOTE-***
*The aircraft is considered the center of the digitized target for that aircraft for the purposes of ensuring an aircraft does not penetrate the NTZ.*

**c.** The following procedures shall be used by the final monitor controllers:

**1.** A controller shall provide position information to an aircraft that is (left/right) of the depicted localizer centerline, and in their opinion is continuing on a track that may penetrate the NTZ.

***PHRASEOLOGY-***
*(Aircraft call sign) I SHOW YOU (left/right) OF THE FINAL APPROACH COURSE.*

**2.** Instruct the aircraft to return immediately to the correct final approach course when aircraft are observed to overshoot the turn-on or continue on a track which will penetrate the NTZ.

***PHRASEOLOGY-***
*YOU HAVE CROSSED THE FINAL APPROACH COURSE. TURN (left/right) IMMEDIATELY AND RETURN TO LOCALIZER/AZIMUTH COURSE.*

*or*

*TURN (left/right) AND RETURN TO THE LOCALIZER/AZIMUTH COURSE.*

**3.** Instruct aircraft on the adjacent final approach course to alter course to avoid the deviating aircraft when an aircraft is observed penetrating or in the controller's judgement will penetrate the NTZ.

***NOTE-***
*An instruction that may include a descent to avoid the deviating aircraft should only be used when there is no other reasonable option available to the controller. In such a case, the descent shall not put the aircraft below the MVA.*

***PHRASEOLOGY-***
*TRAFFIC ALERT, (call sign), TURN (left/right) IMMEDIATELY HEADING (DEGREES), CLIMB AND MAINTAIN (altitude).*

**4.** Terminate radar monitoring when one of the following occurs:

**(a)** Visual separation is applied.

**(b)** The aircraft reports the approach lights or runway in sight.

**(c)** The aircraft has landed or, in the event of a missed approach, is one-half mile beyond the departure end of the runway.

**5.** Do not inform the aircraft when radar monitoring is terminated.

**6.** Do not apply the provisions of para 5-13-1, Monitor on PAR Equipment, for simultaneous ILS, MLS, or ILS and MLS approaches.

**d.** Consideration should be given to known factors that may in any way affect the safety of the instrument approach phase of flight when simultaneous ILS, MLS, or ILS and MLS approaches are being conducted to parallel runways. Factors include but are not limited to wind direction/velocity, wind-shear alerts/reports, severe weather activity, etc. Closely monitor weather activity that could impact the final approach course. Weather conditions in the vicinity of the final approach course may dictate a change of the approach in use.

***REFERENCE-***
*FAAO 7110.65, Radar Service Termination, Para 5-1-13.*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*

# Section 10. Radar Approaches- Terminal

## 5-10-1. APPLICATION

**a.** Provide radar approaches in accordance with standard or special instrument approach procedures.

**b.** A radar approach may be given to any aircraft upon request and may be offered to aircraft in distress regardless of weather conditions or to expedite traffic.

*NOTE-*
*Acceptance of a radar approach by a pilot does not waive the prescribed weather minima for the airport or for the particular aircraft operator concerned. The pilot is responsible for determining if the approach and landing are authorized under the existing weather minima.*

*REFERENCE-*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

## 5-10-2. APPROACH INFORMATION

**a.** Issue the following information to an aircraft that will conduct a radar approach. Current approach information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS broadcast code. All items listed below, except for subpara 3 may be omitted after the first approach if repeated approaches are made and no change has occurred. Transmissions with aircraft in this phase of the approach should occur approximately every minute.

*REFERENCE-*
*FAAO 7110.65, Approach Information, Para 4-7-10.*

**1.** Altimeter setting.

**2.** If available, ceiling and visibility if the ceiling at the airport of intended landing is reported below 1,000 feet or below the highest circling minimum, whichever is greater, or if the visibility is less than 3 miles. Advise pilots when weather information is available via the Automated Weather Observing System (AWOS)/Automated Surface Observing System (ASOS) and, if requested, issue the appropriate frequency.

*NOTE-*
*Automated weather observing systems may be set to provide one minute updates. This one minute data may be useful to the pilot for possible weather trends. Controllers provide service based solely on official weather, i.e., hourly and special observations.*

**3.** Issue any known changes classified as special weather observations as soon as possible. Special weather observations need not be issued after they are included in the ATIS broadcast and the pilot states the appropriate ATIS broadcast code.

**4.** Pertinent information on known airport conditions if they are considered necessary to the safe operation of the aircraft concerned.

**5.** Lost communication procedures as specified in para 5-10-4, Lost Communications.

**b.** Before starting final approach:

*NOTE-*
*1. ASR approach procedures may be prescribed for specific runways, for an airport/heliport, and for helicopters only to a "point-in-space," i.e., a MAP from which a helicopter must be able to proceed to the landing area by visual reference to a prescribed surface route.*

*2. Occasionally, helicopter PAR approaches are available to runways where conventional PAR approaches have been established. In those instances where the two PAR approaches serve the same runway, the helicopter approach will have a steeper glide slope and a lower decision height. By the controller's designating the approach to be flown, the helicopter pilot understands which of the two approaches he/she has been vectored for and which set of minima apply.*

**1.** Inform the aircraft of the type of approach, runway, airport, heliport, or other point, as appropriate, to which the approach will be made. Specify the airport name when the approach is to a secondary airport.

***PHRASEOLOGY-***
*THIS WILL BE A P-A-R/SURVEILLANCE APPROACH TO:*

*RUNWAY (runway number),*

*or*

*(airport name) AIRPORT, RUNWAY (runway number),*

*or*

*(airport name) AIRPORT/HELIPORT.*

*THIS WILL BE A COPTER P-A-R APPROACH TO:*

*RUNWAY (runway number),*

*or*

*(airport name) AIRPORT, RUNWAY (runway number),*

*or*

*(airport name) AIRPORT/HELIPORT.*

**2.** For surveillance approaches, specify the location of the MAP in relation to the runway/airport/heliport.

***PHRASEOLOGY-***
*MISSED APPROACH POINT IS (distance) MILE(S) FROM RUNWAY/AIRPORT/HELIPORT,*

*or for a point-in-space approach,*

*A MISSED APPROACH POINT (distance) MILE(S) (direction from landing area) OF (airport name) AIRPORT/HELIPORT.*

***EXAMPLE-***
*Helicopter point-in-space approach:*

*"Army copter Zulu Two, this will be a surveillance approach to a missed approach point, three point five miles south of Creedon Heliport."*

***REFERENCE-***
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

**c.** Inform an aircraft making an approach to an airport not served by a tower that no traffic or landing runway information is available for that airport.

***PHRASEOLOGY-***
*NO TRAFFIC OR LANDING RUNWAY INFORMATION AVAILABLE FOR THE AIRPORT.*

***REFERENCE-***
*FAAO 7110.65, Altimeter Setting Issuance Below Lowest Usable FL, Para 2-7-2.*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*

## 5-10-3. NO-GYRO APPROACH

When an aircraft will make a no-gyro surveillance or a PAR approach:

**a.** Before issuing a vector, inform the aircraft of the type of approach.

***PHRASEOLOGY-***
*THIS WILL BE A NO-GYRO SURVEILLANCE/P-A-R APPROACH.*

**b.** Instruct the aircraft when to start and stop turn.

***PHRASEOLOGY-***
*TURN LEFT/RIGHT.*
*STOP TURN.*

**c.** After turn on to final approach has been made and prior to the aircraft reaching the approach gate, instruct the aircraft to make half-standard rate turns.

***PHRASEOLOGY-***
*MAKE HALF-STANDARD RATE TURNS.*

***REFERENCE-***
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

## 5-10-4. LOST COMMUNICATIONS

When weather reports indicate that an aircraft will likely encounter IFR weather conditions during the approach, take the following action as soon as possible after establishing radar identification and radio communications (may be omitted after the first approach when successive approaches are made and the instructions remain the same):

***NOTE-***
*Air traffic control facilities at U.S. Army and U.S. Air Force installations are not required to transmit lost communications instructions to military aircraft. All military facilities will issue specific lost communications instructions to civil aircraft when required.*

**a.** If lost communications instructions will require the aircraft to fly on an unpublished route, issue an appropriate altitude to the pilot. If the lost communications instructions are the same for both pattern and final, the pattern/vector controller shall issue both. Advise the pilot that if radio communications are lost for a specified time interval (not more than 1 minute) on vector to final approach, 15 seconds on a surveillance final approach, or 5 seconds on a PAR final approach to:

**1.** Attempt contact on a secondary or a tower frequency.

**2.** Proceed in accordance with visual flight rules if possible.

**3.** Proceed with an approved nonradar approach, or execute the specific lost communications procedure for the radar approach being used.

***NOTE-***
*The approved procedures are those published on the FAA Forms 8260 or applicable military document.*

***PHRASEOLOGY-***
*IF NO TRANSMISSIONS ARE RECEIVED FOR (time interval) IN THE PATTERN OR FIVE/FIFTEEN SECONDS ON FINAL APPROACH, ATTEMPT CONTACT ON (frequency), AND*

*if the possibility exists,*

*PROCEED VFR. IF UNABLE:*

*if approved,*

*PROCEED WITH (nonradar approach), MAINTAIN (altitude) UNTIL ESTABLISHED ON/OVER/FIX/NAVAID/ APPROACH PROCEDURE,*

*or*

*(alternative instructions).*

***PHRASEOLOGY-***
**USN.** *For ACLS operations using Mode I, IA, and II,*

*IF NO TRANSMISSIONS ARE RECEIVED FOR FIVE SECONDS AFTER LOSS OF DATA LINK, ATTEMPT CONTACT ON (frequency), AND*

*if the possibility exists,*

*PROCEED VFR. IF UNABLE:*

*if approved,*

*PROCEED WITH (nonradar approach), MAINTAIN (altitude) UNTIL ESTABLISHED ON/OVER FIX/NAVAID/ APPROACH PROCEDURE,*

*or*

*(alternative instructions).*

**b.** If the final approach lost communications instructions are changed, differ from those for the pattern, or are not issued by the pattern controller, they shall be issued by the final controller.

**c.** If the pilot states that he/she cannot accept a lost communications procedure due to weather conditions or other reasons, request the pilot's intention.

***NOTE-***
*The pilot is responsible for determining the adequacy of lost communications procedures with respect to aircraft performance, equipment capability, or reported weather.*

***REFERENCE-***
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Approach Information, Para 5-10-2.*
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

## 5-10-5. RADAR CONTACT LOST

If radar contact is lost during an approach and the aircraft has not started final approach, clear the aircraft to an appropriate NAVAID/fix for an instrument approach.

***REFERENCE-***
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Final Approach Abnormalities, Para 5-10-14.*
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

## 5-10-6. LANDING CHECK

**USA/USN.** Advise the pilot to perform landing check while the aircraft is on downwind leg and in time to complete it before turning base leg. If an incomplete pattern is used, issue this before handoff to the final controller for a PAR approach, or before starting descent on final approach for surveillance approach.

***PHRASEOLOGY-***
*PERFORM LANDING CHECK.*

***REFERENCE-***
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

## 5-10-7. POSITION INFORMATION

Inform the aircraft of its position at least once before starting final approach.

***PHRASEOLOGY-***
*(Number) MILES (direction) OF (airport name) AIRPORT,*

*or*

*(number) MILES (direction) OF (airport name) AIRPORT ON DOWNWIND/BASE LEG.*

***REFERENCE-***
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

## 5-10-8. FINAL CONTROLLER CHANGEOVER

When instructing the aircraft to change frequency for final approach guidance, include the name of the facility.

***PHRASEOLOGY-***
*CONTACT (name of facility) FINAL CONTROLLER ON (frequency).*

***REFERENCE-***
*FAAO 7110.65, Radio Communications Transfer, Para 2-1-17.*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Arrival Instructions, Para 5-9-4.*
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

### 5-10-9. COMMUNICATIONS CHECK

On initial contact with the final controller, ask the aircraft for a communication check.

*PHRASEOLOGY-*
*(Aircraft call sign), (name of facility) FINAL CONTROLLER. HOW DO YOU HEAR ME?*

*REFERENCE-*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

### 5-10-10. TRANSMISSION ACKNOWLEDGMENT

After contact has been established with the final controller and while on the final approach course, instruct the aircraft not to acknowledge further transmissions.

*PHRASEOLOGY-*
*DO NOT ACKNOWLEDGE FURTHER TRANSMISSIONS.*

*REFERENCE-*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

### 5-10-11. MISSED APPROACH

Before an aircraft starts final descent for a full stop landing and weather reports indicate that any portion of the final approach will be conducted in IFR conditions, issue a specific missed approach procedure approved for the radar approach being conducted.

*PHRASEOLOGY-*
*YOUR MISSED APPROACH PROCEDURE IS (missed approach procedure).*

*NOTE-*
1. *The specific missed approach procedure is published on FAA Form 8260-4 or applicable military document.*

2. *USAF. At locations where missed approach instructions are published in base flying regulations, controllers need not issue missed approach instructions to locally assigned/attached aircraft.*

*REFERENCE-*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

### 5-10-12. LOW APPROACH AND TOUCH-AND-GO

Before an aircraft which plans to execute a low approach or touch-and-go begins final descent, issue appropriate departure instructions to be followed upon completion of the approach. Climb-out instructions must include a specific heading and altitude except when the aircraft will maintain VFR and contact the tower.

*PHRASEOLOGY-*
*AFTER COMPLETING LOW APPROACH/TOUCH AND GO:*

*CLIMB AND MAINTAIN (altitude).*

*TURN (right or left) HEADING (degrees)/FLY RUNWAY HEADING,*

*or*

*MAINTAIN VFR, CONTACT TOWER,*

*or*

*(other instructions as appropriate).*

*NOTE-*
*This may be omitted after the first approach if instructions remain the same.*

*REFERENCE-*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

### 5-10-13. TOWER CLEARANCE

**a.** When an aircraft is on final approach to an airport served by a tower, obtain a clearance to land, touch-and-go, or make low approach. Issue the clearance and the surface wind to the aircraft.

**b.** If the clearance is not obtained or is canceled, inform the aircraft and issue alternative instructions.

*PHRASEOLOGY-*
*TOWER CLEARANCE CANCELED/NOT RECEIVED (alternative instructions).*

*REFERENCE-*
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

### 5-10-14. FINAL APPROACH ABNORMALITIES

Instruct the aircraft if runway environment not in sight, execute a missed approach if previously given; or climb to or maintain a specified altitude and fly a specified course whenever the completion of a safe approach is questionable because one or more of the following conditions exists. The conditions in subparas a, b, and c do not apply after the aircraft passes decision height on a PAR approach.

*EXAMPLE-*
*Typical reasons for issuing missed approach instructions:*
*"Radar contact lost."*
*"Too high/low for safe approach."*
*"Too far right/left for safe approach."*

*REFERENCE-*
*FAAO 7110.65, Position Advisories, Para 5-12-7.*

**a.** Safety limits are exceeded or radical target deviations are observed.

**b.** Position or identification of the aircraft is in doubt.

**c.** Radar contact is lost or a malfunctioning radar is suspected.

***PHRASEOLOGY-***
*(Reason) IF RUNWAY/APPROACH LIGHTS/RUNWAY LIGHTS NOT IN SIGHT, EXECUTE MISSED APPROACH/(alternative instructions).*

***NOTE-***
*If the pilot requests, approval may be granted to proceed with the approach via ILS or another navigational aid/approach aid.*

***REFERENCE-***
*FAAO 7110.65, Radar Contact Lost, Para 5-10-5.*

**d.** Airport conditions or traffic preclude approach completion.

***PHRASEOLOGY-***
*EXECUTE MISSED APPROACH/(alternative instructions), (reason).*

***REFERENCE-***
*FAAO 7110.65, Final Approach Course Interception, Para 5-9-2.*
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

## 5-10-15. MILITARY SINGLE FREQUENCY APPROACHES

**a.** Utilize single frequency approach procedures as contained in a letter of agreement.

**b.** Do not require a frequency change from aircraft on a single frequency approach after the approach has begun unless:

**1.** Landing or low approach has been completed.

**2.** The aircraft is in visual flight rules (VFR) conditions during daylight hours.

**3.** The pilot requests the frequency change.

**4.** An emergency situation exists.

**5.** The aircraft is cleared for a visual approach.

**6.** The pilot cancels instrument flight rules (IFR).

**c.** Accomplish the following steps to complete communications transfer on single frequency approaches after completion of a handoff:

**1.** Transferring controller: Position transmitter selectors to preclude further transmissions on the special use frequencies.

**2.** Receiving controller: Position transmitter and receiver selectors to enable communications on the special use frequencies.

**3.** Do not require or expect the flight to check on frequency unless an actual frequency change is transmitted to the pilot.

# Section 11. Surveillance Approaches- Terminal

## 5-11-1. ALTITUDE INFORMATION

Provide recommended altitudes on final approach if the pilot requests. If recommended altitudes are requested, inform the pilot that recommended altitudes which are at or above the published MDA will be given for each mile on final.

*REFERENCE-*
*FAAO 7210.3, Recommended Altitudes for Surveillance Approaches, Para 10-5-7.*
*FAAO 7110.65, Final Approach Guidance, Para 5-11-5.*

*PHRASEOLOGY-*
*RECOMMENDED ALTITUDES WILL BE PROVIDED FOR EACH MILE ON FINAL TO MINIMUM DESCENT ALTITUDE/CIRCLING MINIMUM DESCENT ALTITUDE.*

## 5-11-2. VISUAL REFERENCE REPORT

Aircraft may be requested to report the runway, approach/runway lights, or airport in sight. Helicopters making a "point-in-space" approach may be requested to report when able to proceed to the landing area by visual reference to a prescribed surface route.

*PHRASEOLOGY-*
*REPORT (runway, approach/runway lights or airport) IN SIGHT.*

*REPORT WHEN ABLE TO PROCEED VISUALLY TO AIRPORT/HELIPORT.*

## 5-11-3. DESCENT NOTIFICATION

**a.** Issue advance notice of where descent will begin and issue the straight-in MDA prior to issuing final descent for the approaches.

*NOTE-*
*The point at which descent to the minimum descent altitude is authorized is the final approach fix unless an altitude limiting stepdown-fix is prescribed.*

**b.** When it is determined that the surveillance approach will terminate in a circle to land maneuver, request the aircraft approach category from the pilot. After receiving the aircraft approach category, provide him/her with the applicable circling MDA prior to issuing final descent for the approach.

*NOTE-*
*Pilots are normally expected to furnish the aircraft approach category to the controller when it is determined that the surveillance approach will terminate in a circle to land maneuver. If this information is not voluntarily given, solicit the aircraft approach category from the pilot, and then issue him/her the applicable circling MDA.*

*PHRASEOLOGY-*
*PREPARE TO DESCEND IN (number) MILE(S).*

*for straight-in approaches,*

*MINIMUM DESCENT ALTITUDE* (altitude).

*for circling approaches,*

*REQUEST YOUR AIRCRAFT APPROACH CATEGORY.*
*(Upon receipt of aircraft approach category), PUBLISHED CIRCLING MINIMUM DESCENT ALTITUDE (altitude).*

## 5-11-4. DESCENT INSTRUCTIONS

When an aircraft reaches the descent point, issue one of the following as appropriate:

*REFERENCE-*
*FAAO 7110.65, Elevation Failure, Para 5-12-9.*

**a.** Unless a descent restriction exists, advise the aircraft to descend to the MDA.

*PHRASEOLOGY-*
*(Number) MILES FROM RUNWAY/AIRPORT/HELIPORT.*
*DESCEND TO YOUR MINIMUM DESCENT ALTITUDE.*

**b.** When a descent restriction exists, specify the prescribed restriction altitude. When the aircraft has passed the altitude limiting point, advise to continue descent to MDA.

*PHRASEOLOGY-*
*(Number) MILES FROM RUNWAY/AIRPORT/HELIPORT.*
*DESCEND AND MAINTAIN (restriction altitude).*

*DESCEND TO YOUR MINIMUM DESCENT ALTITUDE.*

## 5-11-5. FINAL APPROACH GUIDANCE

**a.** Issue course guidance, inform the aircraft when it is on course, and frequently inform the aircraft of any deviation from course. Transmissions with aircraft on surveillance final approach should occur approximately every 15 seconds.

***PHRASEOLOGY-***
*HEADING (heading),*

*ON COURSE,*

*or*

*SLIGHTLY/WELL LEFT/RIGHT OF COURSE.*

***NOTE-***
*Controllers should not key the radio transmitter continuously during radar approaches to preclude a lengthy communications block. The decision on how often transmitters are unkeyed is the controller's prerogative.*

**b.** Issue trend information, as required, to indicate target position with respect to the extended runway centerline and to describe the target movement as appropriate corrections are issued. Trend information may be modified by the terms "RAPIDLY" and "SLOWLY" as appropriate.

***EXAMPLE-***
*"Going left/right of course."*
*"Left/right of course and holding/correcting."*

**c.** Inform the aircraft of its distance from the runway, airport/heliport, or MAP, as appropriate, each mile on final.

***PHRASEOLOGY-***
*(Number) MILE(S) FROM RUNWAY/AIRPORT/ HELIPORT OR MISSED APPROACH POINT.*

**d.** Recommended altitudes shall be furnished, if requested, in accordance with para 5-11-1, Altitude Information.

***PHRASEOLOGY-***
*If requested,*

*ALTITUDE SHOULD BE (altitude).*

## 5-11-6. APPROACH GUIDANCE TERMINATION

**a.** Discontinue surveillance approach guidance when:

**1.** Requested by the pilot.

**2.** In your opinion, continuation of a safe approach to the MAP is questionable.

**3.** The aircraft is over the MAP.

**b.** Surveillance approach guidance may be discontinued when the pilot reports the runway or approach/runway lights in sight or if a "point-in-space" approach, he/she reports able to proceed to the landing area by visual reference to a prescribed surface route.

**c.** When approach guidance is discontinued in accordance with subpara a and the aircraft has reported the runway or approach/runway lights in sight, advise the aircraft of its position and to proceed visually.

***PHRASEOLOGY-***
*(Distance) MILE(S) FROM RUNWAY/AIRPORT/ HELIPORT,*

*or*

*OVER MISSED APPROACH POINT.*

*PROCEED VISUALLY (additional instructions/clearance as required.)*

**d.** When approach guidance is discontinued in accordance with subpara a above and the aircraft has not reported the runway or approach/runway lights in sight, advise the aircraft of its position and to execute a missed approach unless the runway or approach/runway lights are in sight or, if a "point-in-space" approach, unless able to proceed visually.

***PHRASEOLOGY-***
*(Distance) MILE(S) FROM RUNWAY,*

*or*

*OVER MISSED APPROACH POINT.*
*IF RUNWAY,*

*or*

*APPROACH/RUNWAY LIGHTS NOT IN SIGHT, EXECUTE MISSED APPROACH/(missed approach instructions). (Additional instructions/clearance, as required.)*

*(Distance and direction) FROM AIRPORT/HELIPORT/ MISSED APPROACH POINT.*

*IF UNABLE TO PROCEED VISUALLY, EXECUTE MISSED APPROACH. (Additional instructions/clearance, if required.)*

***NOTE-***
*Terminal instrument approach procedures and flight inspection criteria require establishment of a MAP for each procedure including the point to which satisfactory radar guidance can be provided.*

# Section 12. PAR Approaches- Terminal

### 5-12-1. GLIDEPATH NOTIFICATION

Inform the aircraft when it is approaching glidepath (approximately 10 to 30 seconds before final descent).

***PHRASEOLOGY-***
*APPROACHING GLIDEPATH.*

### 5-12-2. DECISION HEIGHT (DH) NOTIFICATION

Provide the DH to any pilot who requests it.

***PHRASEOLOGY-***
*DECISION HEIGHT (number of feet).*

### 5-12-3. DESCENT INSTRUCTION

When an aircraft reaches the point where final descent is to start, instruct it to begin descent.

***PHRASEOLOGY-***
*BEGIN DESCENT.*

### 5-12-4. GLIDEPATH AND COURSE INFORMATION

**a.** Issue course guidance and inform the aircraft when it is on glidepath and on course, and frequently inform the aircraft of any deviation from glidepath or course. Transmissions with aircraft on precision final approach should occur approximately every 5 seconds.

***PHRASEOLOGY-***
*HEADING (heading).*

*ON GLIDEPATH.*

*ON COURSE,*

*or*

*SLIGHTLY/WELL ABOVE/BELOW GLIDEPATH.*

*SLIGHTLY/WELL LEFT/RIGHT OF COURSE.*

***NOTE-***
*Controllers should not key the radio transmitter continuously during radar approaches to preclude a lengthy communications block. The decision on how often transmitters are unkeyed is the controller's prerogative.*

**b.** Issue trend information as required, to indicate target position with respect to the azimuth and elevation cursors and to describe target movement as appropriate corrections are issued. Trend information may be modified by the terms "RAPIDLY" or "SLOWLY", as appropriate.

***EXAMPLE-***
*"Going above/below glidepath."*
*"Going right/left of course."*
*"Above/below glidepath and coming down/up."*
*"Above/below glidepath and holding."*
*"Left/right of course and holding/correcting."*

***REFERENCE-***
*FAAO 7110.65, Position Advisories, Para 5-12-7.*
*FAAO 7110.65, Monitor Information, Para 5-13-3.*

### 5-12-5. DISTANCE FROM TOUCHDOWN

Inform the aircraft of its distance from touchdown at least once each mile on final approach.

***PHRASEOLOGY-***
*(Number of miles) MILES FROM TOUCHDOWN.*

### 5-12-6. DECISION HEIGHT

Inform the aircraft when it reaches the published decision height.

***PHRASEOLOGY-***
*AT DECISION HEIGHT.*

### 5-12-7. POSITION ADVISORIES

**a.** Continue to provide glidepath and course information prescribed in para 5-12-4, Glidepath and Course Information, subparas a and b, until the aircraft passes over threshold.

***NOTE-***
*Glidepath and course information provided below decision height is advisory only. 14 CFR Section 91.175 outlines pilot responsibilities for descent below decision height.*

**b.** Inform the aircraft when it is passing over the approach lights.

***PHRASEOLOGY-***
*OVER APPROACH LIGHTS.*

**c.** Inform the aircraft when it is passing over the landing threshold and inform it of its position with respect to the final approach course.

***PHRASEOLOGY-***
*OVER LANDING THRESHOLD, (position with respect to course).*

***REFERENCE-***
*FAAO 7110.65, Final Approach Abnormalities, Para 5-10-14.*

## 5-12-8. COMMUNICATION TRANSFER

Issue communications transfer instructions.

*PHRASEOLOGY-*
*CONTACT (terminal control function) (frequency, if required) AFTER LANDING.*

*NOTE-*
*Communications transfer instructions should be delayed slightly until the aircraft is on the landing roll-out to preclude diversion of the pilot's attention during transition and touchdown.*

*REFERENCE-*
*FAAO 7110.65, Radio Communications Transfer, Para 2-1-17.*

## 5-12-9. ELEVATION FAILURE

**a.** If the elevation portion of PAR equipment fails during a precision approach:

**1.** Discontinue PAR instructions and tell the aircraft to take over visually or if unable, to execute a missed approach. If the aircraft executes a missed approach, apply subpara 2 below.

*PHRASEOLOGY-*
*NO GLIDEPATH INFORMATION AVAILABLE. IF RUNWAY, APPROACH/RUNWAY LIGHTS, NOT IN SIGHT, EXECUTE MISSED APPROACH/(alternative instructions).*

**2.** If a surveillance approach, ASR or PAR without glide slope, is established for the same runway, inform the aircraft that a surveillance approach can be given. Use ASR or the azimuth portion of the PAR to conduct the approach and apply Chapter 5, Radar, Section 11, Surveillance Approaches- Terminal. When the PAR azimuth is used, inform the pilot that mileage information will be from touchdown, and at those runways where specific minima have been established for PAR without glideslope, inform the pilot that the PAR azimuth will be used for the approach.

*EXAMPLE-*
**1.** *Approach information when PAR azimuth used:*
*"This will be a surveillance approach to runway three six. Mileages will be from touchdown."*
*or*
*"This will be a surveillance approach to runway three six using P-A-R azimuth. Mileages will be from touchdown."*

**2.** *Descent Instructions:*
*"Five miles from touchdown, descend to your minimum descent altitude/minimum altitude."*

*REFERENCE-*
*FAAO 7110.65, Approach Information, Para 5-10-2.*
*FAAO 7110.65, Descent Instructions, Para 5-11-4.*

**b.** If the elevation portion of the PAR equipment is inoperative before starting a precision approach, apply subpara a2.

## 5-12-10. SURVEILLANCE UNUSABLE

PAR approaches may be conducted when the ASR is unusable provided a nonradar instrument approach will position the aircraft over a navigational aid or DME fix within the precision radar coverage, or an adjacent radar facility can provide a direct radar handoff to the PAR controller.

*NOTE-*
*The display of the NAVAID or DME fix in accordance with para 5-3-2, Primary Radar Identification Methods, is not required provided the NAVAID or DME fix can be correlated on a PAR scope.*

# Section 13. Use of PAR for Approach Monitoring- Terminal

## 5-13-1. MONITOR ON PAR EQUIPMENT

Aircraft conducting precision or nonprecision approaches shall be monitored by PAR equipment if the PAR final approach course coincides with the NAVAID final approach course from the final approach fix to the runway and one of the following conditions exists:

*NOTE-*
1. *The provisions of this section do not apply to monitoring simultaneous ILS, MLS, or ILS and MLS approaches.*

2. *This procedure is used in PAR facilities operated by the FAA and the military services at joint-use civil/military locations and military installations during the operational hours of the PAR.*

**a.** The reported weather is below basic VFR minima.

**b.** ***USA Not applicable.*** At night.

**c.** Upon request of the pilot.

*REFERENCE-*
*FAAO 7110.65, Simultaneous Independent ILS/MLS Approaches- Dual & Triple, Para 5-9-7.*

## 5-13-2. MONITOR AVAILABILITY

**a.** Inform the aircraft of the frequency on which monitoring information will be transmitted if it will not be the same as the communication frequency used for the approach.

***PHRASEOLOGY-***
*RADAR MONITORING ON LOCALIZER VOICE (frequency),*

*and if applicable,*

*CONTACT (terminal control function) (frequency, if required) AFTER LANDING.*

**b.** If the approach is not monitored, inform the aircraft that radar monitoring is not available.

***PHRASEOLOGY-***
*RADAR MONITORING NOT AVAILABLE.*

**c.** If conditions prevent continued monitor after the aircraft is on final approach, advise the pilot. State the reason and issue alternate procedures as appropriate.

***PHRASEOLOGY-***
*(Reason), RADAR MONITORING NOT AVAILABLE, (alternative instructions).*

*NOTE-*
*Approach monitoring is a vital service, but during the approach, the controller acts primarily as a safety observer and does not actually guide the aircraft. Loss of the radar monitoring capability (and thus availability) is no reason to terminate an otherwise good instrument approach. Advise the pilot that radar contact has been lost (or other reason as appropriate), that radar monitoring is not available, and of actions for the pilot to take in either proceeding with or breaking off the approach; i.e., contact tower, remain on PAR frequency, etc.*

## 5-13-3. MONITOR INFORMATION

When approaches are monitored, take the following action:

**a.** Advise the pilot executing a nonprecision approach that glidepath advisories are not provided. Do this prior to the pilot beginning the final descent.

***PHRASEOLOGY-***
*GLIDEPATH ADVISORIES WILL NOT BE PROVIDED.*

**b.** Inform the aircraft when passing the final approach fix (nonprecision approaches) or when passing the outer marker or the fix used in lieu of the outer marker (precision approaches).

***PHRASEOLOGY-***
*PASSING (FIX).*

**c.** Advise the pilot of glidepath trend information (precision approaches) and course trend information to indicate target position and movement with respect to the elevation or azimuth cursor when the aircraft target corresponds to a position of well above/below the glidepath or well left/right of course and whenever the aircraft exceeds the radar safety limits. Repeat if no correction is observed.

***EXAMPLE-***
*Course trend information:*
*"(Ident), well right/left of P-A-R course, drifting further right/left."*

*Glidepath trend information:*
*"(Ident), well above/below P-A-R glidepath."*

*REFERENCE-*
*FAAO 7110.65, Glidepath and Course Information, Para 5-12-4.*

**d.** If, after repeated advisories, the aircraft is observed proceeding outside the safety limits or a radical target deviation is observed, advise the aircraft if unable to proceed visually, to execute a missed approach. Issue a specific altitude and heading if a procedure other than the published missed approach is to be executed.

***PHRASEOLOGY-***

*(Position with respect to course or glidepath). IF NOT VISUAL, ADVISE YOU EXECUTE MISSED APPROACH (alternative instructions).*

**e.** Provide monitor information until the aircraft is over the landing threshold or commences a circling approach.

**f.** Provide azimuth monitoring only at locations where the MLS glidepath and the PAR glidepath are not coincidental.

***REFERENCE-***

*FAAO 7110.65, Radar Service Termination, Para 5-1-13.*

# Section 14. Automation- En Route

## 5-14-1. CONFLICT ALERT (CA) AND MODE C INTRUDER (MCI) ALERT

**a.** When a CA or MCI alert is displayed, evaluate the reason for the alert without delay and take appropriate action.

***NOTE-***
*DARC does not have CA/MCI alert capability.*

***REFERENCE-***
*FAAO 7110.65, Safety Alert, Para 2-1-6.*

**b.** If another controller is involved in the alert, initiate coordination to ensure an effective course of action. Coordination is not required when immediate action is dictated.

**c.** Suppressing/Inhibiting CA/MCI alert.

**1.** The controller may suppress the display of a CA/MCI alert from a control position with the application of one of the following suppress/inhibit computer functions:

**(a)** The Conflict Suppress (CO) function may be used to suppress the CA/MCI display between specific aircraft for a specific alert.

***NOTE-***
*See NAS-MD-678 for the EARTS conflict suppress message.*

**(b)** The Group Suppression (SG) function shall be applied exclusively to inhibit the displaying of alerts among military aircraft engaged in special military operations where standard en route separation criteria does not apply.

***NOTE-***
*Special military operations where the SG function would typically apply involve those activities where military aircraft routinely operate in proximities to each other that are less than standard en route separation criteria; i.e., air refueling operations, ADC practice intercept operations, etc.*

**2.** The computer entry of a message suppressing a CA/MCI alert constitutes acknowledgment for the alert and signifies that appropriate action has or will be taken.

**3.** The CA/MCI alert may not be suppressed or inhibited at or for another control position without being coordinated.

## 5-14-2. EN ROUTE MINIMUM SAFE ALTITUDE WARNING (E-MSAW)

**a.** When an E-MSAW alert is displayed, immediately analyze the situation and, if necessary, take the appropriate action to resolve the alert.

***NOTE-***
**1.** *Caution should be exercised when issuing a clearance to an aircraft in reaction to an E-MSAW alert to ensure that adjacent MIA areas are not a factor.*

**2.** *DARC does not have E-MSAW capability.*

***REFERENCE-***
*FAAO 7110.65, Safety Alert, Para 2-1-6.*

**b.** The controller may suppress the display of an E-MSAW alert from his/her control position with the application of one of the following suppress/inhibit computer functions:

**1.** The specific alert suppression message may be used to inhibit the E-MSAW alerting display on a single flight for a specific alert.

**2.** The indefinite alert suppression message shall be used exclusively to inhibit the display of E-MSAW alerts on aircraft known to be flying at an altitude that will activate the alert feature of one or more MIA areas within an ARTCC.

***NOTE-***
**1.** *The indefinite alert suppression message will remain in effect for the duration of the referenced flight's active status within the ARTCC unless modified by controller action.*

**2.** *The indefinite alert suppression message would typically apply to military flights with clearance to fly low-level type routes that routinely require altitudes below established minimum IFR altitudes.*

**c.** The computer entry of a message suppressing or inhibiting E-MSAW alerts constitutes acknowledgment for the alert and indicates that appropriate action has or will be taken to resolve the situation.

## 5-14-3. COMPUTER ENTRY OF ASSIGNED ALTITUDE

The data block shall always reflect the current status of the aircraft unless otherwise specified in a facility directive. Whenever an aircraft is cleared to maintain an altitude different from that in the flight plan database, enter into the computer one of the following:

*NOTE-*
*A facility directive may be published deleting the interim altitude computer entry requirements of subpara b. The directive would apply to those conditions where heavy traffic or sector complexity preclude meeting these entry requirements.*

*REFERENCE-*
*FAAO 7210.3, Waiver to Interim Altitude Requirements, Para 8-2-7.*

**a.** The new assigned altitude if the aircraft will (climb or descend to and) maintain the new altitude, or

**b.** An interim altitude if the aircraft will (climb or descend to and) maintain the new altitude for a short period of time and subsequently be recleared to the altitude in the flight plan database or a new altitude or a new interim altitude.

*NOTE-*
**1.** *Use of the interim altitude function will ensure that the data block reflects the actual status of the aircraft and eliminate superfluous altitude updates.*

**2.** *EARTS does not have interim altitude capability.*

### 5-14-4. ENTRY OF REPORTED ALTITUDE

Whenever Mode C altitude information is either not available or is unreliable, enter reported altitudes into the computer as follows:

*NOTE-*
*Altitude updates are required to assure maximum accuracy in applying slant range correction formulas.*

**a.** When an aircraft reaches the assigned altitude.

**b.** When an aircraft at an assigned altitude is issued a clearance to climb or descend.

**c.** A minimum of each 10,000 feet during climb to or descent from FL 180 and above.

### 5-14-5. SELECTED ALTITUDE LIMITS

To ensure the display of Mode C targets and data blocks, take the following actions:

*NOTE-*
*Exception to these requirements may be authorized for specific altitudes in certain ARTCC sectors if defined in appropriate facility directives and approved by the regional AT division manager.*

**a.** NAS en route Stage A/DARC, display altitude limits in the "R" CRD when operating on NAS en route Stage A or on the PVD/MDM when operating on DARC and select the display filter keys on the PVD/MDM to include, as a minimum, the altitude stratum of the sector; plus

**1.** 1,200 feet above the highest and below the lowest altitude or flight level of the sector where 1,000 feet vertical separation is applicable; and

**2.** 2,200 feet above the highest and below the lowest flight level of the sector where 2,000 feet vertical separation is applicable.

**b.** EARTS. Display the EARTS altitude filter limits to include, as a minimum, the altitude stratum of the sector; and

**1.** 1,200 feet above the highest and below the lowest altitude or flight level of the sector where 1,000 feet vertical separation is applicable; and

**2.** 2,200 feet above the highest and below the lowest flight level of the sector where 2,000 feet vertical separation is applicable.

*REFERENCE-*
*FAAO 7110.65, Alignment Accuracy Check, Para 5-1-2.* ■

### 5-14-6. SECTOR ELIGIBILITY

The use of the OK function is allowed to override sector eligibility only when one of the following conditions is met:

**a.** Prior coordination is effected.

**b.** The flight is within the control jurisdiction of the sector.

### 5-14-7. COAST TRACKS

Do not use coast tracks in the application of either radar or nonradar separation criteria.

### 5-14-8. CONTROLLER INITIATED COAST TRACKS

**a.** Initiate coast tracks only in Flight Plan Aided Tracking (FLAT) mode, except "free" coast tracking may be used as a reminder that aircraft without corresponding computer-stored flight plan information are under your control.

*NOTE-*

*1. To ensure tracks are started in FLAT mode, perform a start track function at the aircraft's most current reported position, then immediately "force" the track into coast tracking by performing another start function with "CT" option in field 64. Making amendments to the stored route with trackball entry when the aircraft is rerouted, and repositioning the data block to coincide with the aircraft's position reports are methods of maintaining a coast track in FLAT mode.*

*2. DARC does not have the capability to initiate coast tracks.*

**b.** Prior to initiating a coast track, ensure the following:

**1.** A departure message or progress report corresponding with the aircraft's current position is entered into the computer.

**2.** The track being started is within the Posted Time Update Interval (PTUI) of the aircraft's computer-estimated position and the Flight Plan Track Position Difference (FTPD) distance of the aircraft's flight plan route.

*NOTE-*

*FTPD is an automation parameter, normally set to 15 miles, that is compared with the tracked target's perpendicular distance from the stored flight plan route. If the track is within the parameter miles, it is eligible for "FLAT tracking." PTUI is an automation parameter, normally set to 3 minutes, that is compared against the difference between the calculated time of arrival and the actual time of arrival over a fix. If the difference is greater than PTUI, the flight plan's stored data will be revised and fix-time update messages will be generated.*

**c.** As soon as practicable after the aircraft is in radar surveillance, initiate action to cause radar tracking to begin on the aircraft.

# Section 15. Automated Radar Terminal Systems (ARTS)- Terminal

## 5-15-1. APPLICATION

ARTS/STARS may be used for identifying aircraft assigned a discrete beacon code, maintaining identity of targets, and performing handoffs of these targets between controllers.

*NOTE-*
*USAF/USN. Where PIDP/DAIR equipment is capable of performing the functions described in this section, it may be used accordingly.*

## 5-15-2. RESPONSIBILITY

This equipment does not relieve the controller of the responsibility to ensure proper identification, maintenance of identity, handoff of the correct target associated with the alphanumeric data, and separation of aircraft.

## 5-15-3. FUNCTIONAL USE

In addition to other uses specified herein, terminal automation may be used for the following functions:

**a.** Tracking.

**b.** Tagging.

**c.** Handoff.

**d.** Altitude information.

*REFERENCE-*
*FAAO 7110.65, Altitude Filters, Para 5-2-23.*

**e.** Coordination.

**f.** Ground speed.

**g.** Identification.

## 5-15-4. SYSTEM REQUIREMENTS

Use terminal automation systems as follows:

*NOTE-*
*Locally developed procedures, operating instructions, and training material are required because of differences in equipment capability. Such locally developed procedures shall be supplemental to those contained in this section and shall be designed to make maximum use of the ARTS equipment.*

**a.** Inform all appropriate positions before terminating or reinstating use of the terminal automation system at a control position. When terminating the use of terminal automation systems, all pertinent flight data of that position shall be transferred or terminated.

**b.** Inform other interfaced facilities of scheduled and unscheduled shutdowns.

**c.** Initiate a track/tag on all aircraft to the maximum extent possible. As a minimum, aircraft identification should be entered, and automated handoff functions should be used.

**d.** Assigned altitude, if displayed, shall be kept current at all times. Climb and descent arrows, where available, shall be used to indicate other than level flight.

**e.** Do not use the automatic altitude readout of an aircraft under another controller's jurisdiction for vertical separation purposes without verbal coordination.

## 5-15-5. INFORMATION DISPLAYED

**a.** Two-letter ICAO designators or three-letter designators, as appropriate, shall be used unless program limitations dictate the use of a single letter alpha prefix.

**b.** Use of the inhibit/select functions to remove displayed information no longer required shall be in accordance with local directives, which should ensure maximum required use of the equipment.

**c.** Information displayed shall be in accordance with national orders and specified in local directives.

## 5-15-6. CA/MCI

**a.** When a CA or MCI alert is displayed, evaluate the reason for the alert without delay and take appropriate action.

*REFERENCE-*
*FAAO 7110.65, Safety Alert, Para 2-1-6.*

**b.** If another controller is involved in the alert, initiate coordination to ensure an effective course of action. Coordination is not required when immediate action is dictated.

**c.** Suppressing/Inhibiting CA/MCI alert.

**1.** The suppress function may be used to suppress the display of a specific CA/MCI alert.

**2.** The inhibit function shall only be used to inhibit the display of CA for aircraft routinely engaged in operations where standard separation criteria do not apply.

*NOTE-*
*Examples of operations where standard separation criteria do not apply are ADC practice intercept operations and air shows.*

**3.** Computer entry of a message suppressing a CA/MCI alert constitutes acknowledgment for the alert and signifies that appropriate action has or will be taken.

**4.** CA/MCI alert may not be suppressed or inhibited at or for another control position without being coordinated.

## 5-15-7. INHIBITING MINIMUM SAFE ALTITUDE WARNING (MSAW)

**a.** Inhibit MSAW processing of VFR aircraft and aircraft that cancel instrument flight rules (IFR) flight plans unless the pilot specifically requests otherwise.

*REFERENCE-*
*FAAO 7110.65, VFR Aircraft in Weather Difficulty, Para 10-2-7.*
*FAAO 7110.65, Radar Assistance to VFR Aircraft in Weather Difficulty, Para 10-2-8.*

**b.** A low altitude alert may be suppressed from the control position. Computer entry of the suppress message constitutes an acknowledgment for the alert and indicates that appropriate action has or will be taken.

## 5-15-8. TRACK SUSPEND FUNCTION

Use the track suspend function only when data block overlap in holding patterns or in proximity of the final approach create an unworkable situation. If necessary to suspend tracks, those which are not displaying automatic altitude readouts shall be suspended. If the condition still exists, those displaying automatic altitude readouts may then be suspended.

# Section 16. TPX-42- Terminal

### 5-16-1. APPLICATION

Each TPX-42 facility shall utilize the equipment to the maximum extent possible consistent with local operating conditions.

### 5-16-2. RESPONSIBILITY

This equipment does not relieve the controller of the responsibility to ensure proper identification, maintenance of identity, handoff of the correct radar beacon target associated with numeric data, and the separation of aircraft.

### 5-16-3. FUNCTIONAL USE

TPX-42 may be used for the following functions:

**a.** Tagging.

**b.** Altitude information.

*REFERENCE-*
*FAAO 7110.65, Altitude Filters, Para 5-2-23.*

**c.** Coordination.

**d.** Target identity confirmation.

### 5-16-4. SYSTEM REQUIREMENTS

Use the TPX-42 system as follows:

**a.** TPX-42 facilities shall inform adjacent facilities of scheduled and unscheduled shutdowns.

**b.** To the maximum extent practicable, tags should be utilized for all controlled aircraft.

### 5-16-5. INFORMATION DISPLAYED

**a.** Inhibiting portions of the tag shall be in accordance with facility directives, which shall ensure maximum required use of the equipment.

**b.** Mode C altitude information shall not be inhibited unless a ground malfunction causes repeated discrepancies of 300 feet or more between the automatic altitude readouts and pilot reported altitudes.

### 5-16-6. INHIBITING LOW ALTITUDE ALERT SYSTEM (LAAS)

Assign a beacon code to a VFR aircraft or to an aircraft that has canceled its IFR flight plan to inhibit LAAS processing unless the aircraft has specifically requested LAAS.